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**Bronchitis generally responds
within a few hours to**

ILOTYCIN

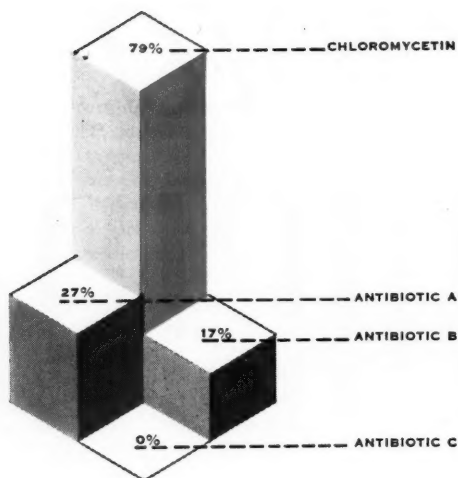
(ERYTHROMYCIN, LILLY)

The common pathogens are rapidly destroyed; infection resolves and soreness diminishes. Notably safe and well tolerated.

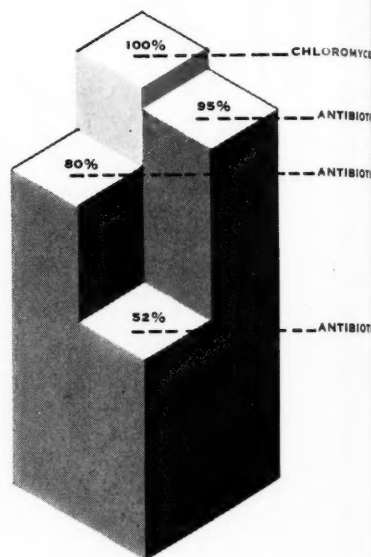
dosage: 250 or 500 mg. q. 6 h. Children,
5 mg. per pound of body weight q. 6 h.

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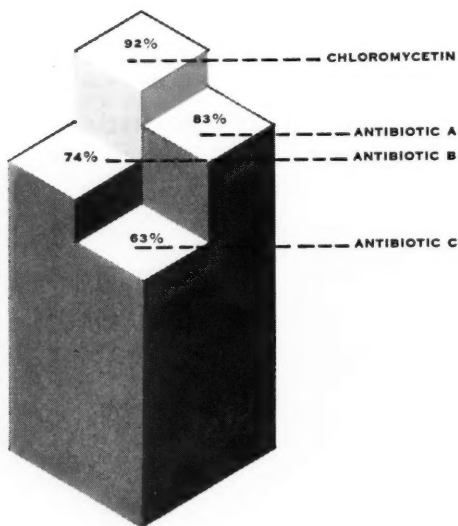
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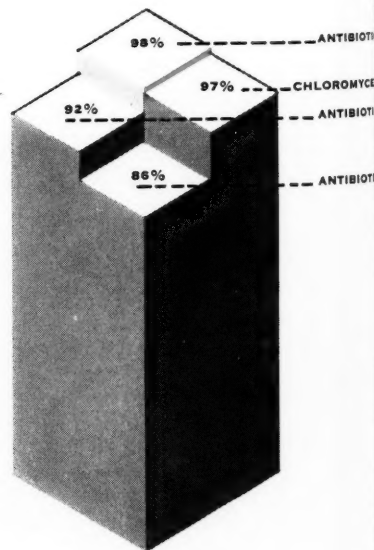
PROTEUS GROUP
(431-506 STRAINS)



STREPTOCOCCUS VIRIDANS
(42-58 STRAINS)



NONHEMOLYTIC STREPTOCOCCUS
(109-141 STRAINS)



HEMOLYTIC STREPTOCOCCUS
(179-197 STRAINS)

Original Contributions

The Importance of the Pulmonary Nodule

DONALD L. PAULSON, M.D.

Dallas, Texas

THE importance of the pulmonary nodule has begun to be appreciated only recently in spite of numerous papers which have been published on the subject since 1936. The frequency with which pulmonary nodules are discovered is in direct proportion to the use of routine roentgenograms of the chest. In recent years an active interest in the significance of the pulmonary nodule has been stimulated by an increasing frequency of discovery of these lesions, the realization of their malignant possibilities in a high percentage of cases, and advances in anesthetic and thoracic surgical techniques.

The term pulmonary nodule as used here refers to a single nodular lesion within the lung substance, usually less than 6 cm. in diameter, and surrounded by normal appearing lung tissue on all sides. Hilar, mediastinal, chest wall, and superior sulcus masses are excluded, as are the extremely small or large masses, all of which present a different problem. A pulmonary nodule may or may not produce symptoms. It need not be of homogeneous density and may contain calcium. In a broad sense its shape is roughly round or oval, but its border may be notched or nodular, and is not always sharply circumscribed. These nodules have been referred to as coin lesions, solitary round lesions, solitary circumscribed lesions, solitary intrapulmonary tumors, isolated intrathoracic nodules, and single circumscribed intrathoracic densities. There are objections to all of these terms, as pointed out by Sharp and Kinsella¹ and by Fink² on the basis of inaccuracy of description. The term pulmonary nodule as herein defined is believed to be more appropriate, as it is a simple anatomic description of a single pulmonary lesion usually of undetermined etiology clinically.

Although Graham and Singer³ as long ago as 1936 and Alexander⁴ in 1942 advocated thoracotomy as the only reliable means of establishing a diagnosis for a circumscribed pulmonary lesion, there are those who do not appreciate the reasons therefor and mistakenly believe that these lesions are usually benign. That this view is still widely prevalent in the medical profession is the stimulus for this paper. Only by careful study of the material available and the widespread dissemination of the results will erroneous beliefs be disavowed. Those skilled in the treatment of chest diseases are in almost complete agreement on the need for prompt exploratory thoracotomy as a diagnostic as well as a therapeutic procedure for the indeterminate pulmonary nodule. That there is not such universal agreement among the general medical profession and the lay public constitutes a challenge of education for those of us well versed in diseases of the chest.

Review of the Literature

From a review of the literature it becomes clear that although the incidence of malignancy varies in individual reported series of pulmonary nodules from 7 per cent to 55 per cent, a significant number are cancers. The average incidence of malignancy for 897 cases is 36 per cent (Table I). It is important to realize that no one series is comparable to another because each series is selective on the basis of age, symptoms, size of the lesion, and the source of patients.

The reports of Jones and Cleve,⁵ Effler, Blades and Marks,⁶ Grow, Bradford and Mahon,⁷ and Storey, Grant and Rothman⁸ dealt in the main with young healthy adult males on active duty in the Armed Forces. Yet the incidence of malignancy ranged from 7 to 24 per cent. The patients in the series of Davis and Klepser,¹⁰ O'Brien, Tuttle and Ferkanev,¹² Harrington,¹⁵ Hood, Good, Claggett

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PULMONARY NODULE—PAULSON

TABLE I. INCIDENCE OF MALIGNANCY IN VARIOUS REPORTED SERIES OF PULMONARY NODULES

| AUTHOR | NUMBER OF PATIENTS | NUMBER MALIGNANT | PERCENT MALIGNANT |
|--|--------------------|------------------|-------------------|
| Jones and Cleve, 1954 | 14 | 1 | 7.0 |
| Effler, Blades and Marks, 1948 | 24 | 4 | 16.6 |
| Grow, Bradford and Mahon, 1948 | 86 | 21 | 24.0 |
| Storey, Grant and Rothman, 1953 | 40 | 7 | 17.5 |
| Husfeldt and Carlson, 1950 | 33 | 7 | 21.2 |
| Davis and Klepser, 1950 | 67 | 37 | 55.0 |
| Davis, Katz and Peabody, 1955 | 67 | 34 | 51.0 |
| O'Brien, Tuttle and Ferkany, 1948 | 21 | 9 | 42.9 |
| Sharp and Kinsella, 1950 | 55 | 15 | 27.3 |
| Fink, 1951 | 30 | 10 | 33.3 |
| Effler, 1951 | 16 | 7 | 44.0 |
| Abeles and Enrich, 1951 | 31 | 13 | 42.0 |
| Harrington, 1951 | 16 | 7 | 43.8 |
| Wolpaw, 1952 | 25 | 10 | 40.0 |
| Hood, Good, Clagett and McDonald, 1953 | 158 | 55 | 35.3 |
| May, Rose and Dugan, 1954 | 36 | 8 | 22.0 |
| Paulson and Shaw, 1955 | 180 | 78 | 43.0 |
| TOTAL | 897 | 323 | 36.0 |

and McDonald¹⁷ were unselected with respect to age, and the incidence of cancer varied from 35 to 55 per cent.

The presence of symptoms has a definite effect on the incidence of malignancy. Some authors include only asymptomatic lesions and others all types of lesions regardless of symptoms. In the latter group, notably the reports of Davis and Klepser,¹⁰ and O'Brien, Tuttle and Ferkany,¹² the cancer rates were higher, 55 per cent to 42.9 per cent, respectively. Symptoms were present in 76 per cent of the patients with a malignant tumor and in 23 per cent of those in whom the mass proved to be benign in Davis and Klepser's series.

The size of the lesion is also a selective factor. Sharp and Kinsella¹ limited their study to pulmonary nodules 1 to 4 centimeters in diameter and found malignancy in 27 per cent. It is obvious that larger pulmonary masses are more apt to be malignant. Thornton, Adams and Bloch¹⁹ found an incidence of malignancy of 78.3 per cent of twenty-three patients having huge pulmonary masses.

The source of patients will have a natural selective effect in any series of pulmonary nodules. Reports emanating from facilities devoted particularly to the treatment of pulmonary tuberculosis would be expected to include a higher percentage of granulomas and consequently a lower incidence of cancer. Similarly, a thoracic surgeon reporting only his surgically proven lesions will find his series weighted in favor of carcinoma, because patients referred to him for surgery frequently will be those in whom cancer is suspected.

Material and Method of Study

The present series include 180 patients having pulmonary nodules seen by my associate, Dr. Robert R. Shaw, and me in the private practice of thoracic surgery from 1945 to 1955, a period of ten years. All patients seen by us meeting the definition of a pulmonary nodule were included regardless of age, symptomatology, or whether surgically proven or not. All factors of selectivity are interlinked, and the exclusion of an asymptomatic granuloma in a younger person because it is not surgically proven weights the series in favor of malignancy. It is for this reason that the surgically unproven as well as those proven by operation are included.

Of the total number of 180 patients with pulmonary nodules, 143 or 80 per cent were operated upon and the diagnosis proven pathologically. The remaining thirty-seven patients were not operated upon because surgery was contraindicated or refused or because a reliable diagnosis could be made on clinical grounds alone.

TABLE II. CLASSIFICATION OF 180 CONSECUTIVE PULMONARY NODULES

| TYPE OF NODULE | NUMBER | PERCENT OF TOTAL | NUMBER | PERCENT OF TOTAL |
|-----------------------------|--------|------------------|--------|------------------|
| I. Malignant | | | 78 | 43 |
| Bronchogenic carcinoma | 62 | 34 | | |
| Metastatic nodule | 7 | 4 | | |
| Bronchial adenoma | 9 | 5 | | |
| II. Benign Tumors | | | 10 | 6 |
| Hamartoma | 5* | 3 | | |
| Mesothelioma | 5 | 3 | | |
| III. Inflammatory | | | 74 | 41 |
| Granuloma | 67 | 37 | | |
| Tuberculosis (24) | | | | |
| Coccidioides (12) | | | | |
| Etiology unknown (31) | | | | |
| (Unproven 19 or 11 percent) | | | | |
| Pneumonitis, abscess, cyst | 7 | 4 | | |
| IV. Miscellaneous | | | 5 | 3 |
| V. Unclassified | | | 13 | 7 |
| TOTAL | | | 180 | 100 |

The pulmonary nodule could be classified on a clinical and roentgenographic basis in our opinion in the case of twenty-four patients or 13 per cent of the total number. Five of these patients presented incontrovertible evidence of malignancy either on first examination or as a result of evidence gained later. The lesions could not be classified in the remaining thirteen patients or 7 per cent of the total. These were patients in whom surgery was contraindicated or refused and sufficient clinical or roentgenographic evidence was present to warrant classification on this basis.

PULMONARY NODULE—PAULSON

Results

The results of classification of 180 consecutive pulmonary nodules are tabulated in Table II.

It is significant that seventy-eight patients had a malignant nodule, an incidence of malignancy

and seventy-four women. Men predominated over women in both the groups of bronchogenic carcinoma and granuloma. Women predominated over men in the groups of bronchial adenoma, pneumonitis, abscess, and cyst and the unclassified

TABLE III. DISTRIBUTION OF 180 PULMONARY NODULES ACCORDING TO AGE AND SEX OF THE PATIENTS

| TYPE OF NODULE | TOTAL | MEN | WOMEN | 1-30 | 31-40 | 41-50 | 51-60 | 61-70 | 71-80 | 81-90 | RANGE |
|----------------------------|------------|------------|-----------|-----------|-----------|-----------|-----------|-----------|----------|----------|-------|
| Tumors | | | | | | | | | | | |
| Hamartoma | 5 | 3 | 2 | 0 | 0 | 3 | 0 | 2 | 0 | 0 | 41-65 |
| Mesothelioma | 5 | 2 | 3 | 1 | 0 | 1 | 3 | 0 | 0 | 0 | 20-51 |
| Bronchial Adenoma | 9 | 0 | 9 | 0 | 2 | 3 | 3 | 1 | 0 | 0 | 32-64 |
| Bronchogenic Carcinoma | 62 | 48 | 14 | 0 | 3 | 18 | 21 | 19 | 3 | 0 | 36-79 |
| Metastatic Nodule | 7 | 3 | 4 | 1 | 1 | 2 | 0 | 3 | 0 | 0 | 6-64 |
| Inflammatory | | | | | | | | | | | |
| Granuloma | 67 | 40 | 27 | 9 | 20 | 13 | 17 | 8 | 0 | 0 | 23-66 |
| Pneumonitis, Abscess, Cyst | 7 | 2 | 5 | 0 | 0 | 4 | 2 | 1 | 0 | 0 | 43-68 |
| Miscellaneous | 5 | 3 | 2 | 0 | 0 | 4 | 1 | 0 | 0 | 0 | 41-55 |
| Unclassified | 13 | 5 | 8 | 1 | 3 | 3 | 3 | 2 | 0 | 1 | 15-61 |
| TOTAL | 180 | 106 | 74 | 12 | 29 | 49 | 50 | 36 | 3 | 1 | |

of 43 per cent. There were sixty-two bronchogenic carcinomas or 34 per cent, seven metastatic nodules or 4 per cent, and nine bronchial adenomas or 5 per cent of the total. Only ten patients or 6 per cent of the total 180 patients had true benign tumors.

An inflammatory nodule was present in seventy-four patients or 41 per cent of the total. Of these, sixty-seven or 37 per cent of the total were classified as granulomas. There were twenty-four tuberculomas, twelve coccidioidal granulomas, and thirty-one of undetermined etiology. Nineteen of the thirty-one nodules classified as granulomas of undetermined etiology were not proven pathologically. The age of the patient and the roentgenographic appearance of lamination, the presence of calcification, or surrounding halo justified this classification and surgery was unnecessary for corroboration.

Pneumonitis, abscess, or filled in cyst accounted for the pulmonary nodule in seven patients or 4 per cent of the total.

Miscellaneous lesions, including arteriovenous fistula, pulmonary infarction, pleural fibrosis, actinomycosis, and Hodgkins disease, accounted for five pulmonary nodules or 3 per cent of the total.

Thirteen pulmonary nodules or 7 per cent of the total could not be classified.

The age and sex distribution of the 180 patients is given in Table III. There were 106 men

group. Men and women were about evenly divided in the benign tumor, metastatic nodule, and miscellaneous group.

The ages of these 180 patients ranged from six to eighty-one years. The six-year-old patient was a girl who has survived and is well eight years following the removal of a metastatic nodule secondary to a Wilm's tumor of the kidney. The age distribution of the bronchogenic carcinoma group was from thirty-six to seventy-nine years, predominating in the fifth, sixth and seventh decades. The thirty-six-year-old patient was a woman whose pulmonary nodule was due to an adenocarcinoma which was watched and treated with streptomycin for ten months because she had some healed scars in the contralateral lung. There were no bronchogenic carcinomas below the age of thirty-five years.

The age distribution of the granuloma group varied from twenty-three to sixty-six years, the larger groups being in the fourth, fifth and sixth decades but extending into the third and seventh decades.

The remaining groups were small and evenly distributed as to age.

The incidence of malignancy increases from 43 per cent in the fifth decade to 64 per cent in the seventh decade. Seven malignant nodules were found in 41 patients under the age of forty years, an incidence of 17 per cent. The age of

PULMONARY NODULE—PAULSON

TABLE IV. SURGICAL PROCEDURES DONE FOR 144 PULMONARY NODULES

| TYPE OF NODULE | SEGMENTAL RESECTION | LOBECTOMY | PNEUMONECTOMY | EXPLORATORY THORACOTOMY |
|-----------------------------|---------------------|-----------|---------------|-------------------------|
| Malignant | | | | |
| Bronchogenic carcinoma | 6 | 39 | 12 | 2 |
| Metastatic malignancy | 1 | 4 | 1 | |
| Adenoma | 2 | 8 | | |
| Benign | | | | |
| Hamartoma | 4 | 1 | | |
| Mesothelioma | 4 | 1 | | |
| | 17 | 53 | 13 | 2 |
| Inflammatory | | | | |
| Pneumonitis, abscess, cyst | 3 | 3 | | |
| Tuberculosis | 21 | 3 | | |
| Granuloma, etiology unknown | 12 | 0 | | |
| Coccidioidomycosis | 8 | 4 | | |
| | 44 | 10 | | |
| Miscellaneous | | | | |
| Arteriovenous fistula | 0 | 1 | | |
| Pulmonary infarction | 1 | 0 | | |
| Pleural fibrosis | 1 | 0 | | |
| Actinomycosis | 0 | 1 | | |
| Hodgkins disease | 0 | 1 | | |
| | 2 | 3 | | |
| TOTAL | 63 | 66 | 13 | 2 |

thirty-five years seems to be a more reasonable dividing line as far as bronchogenic carcinoma is concerned because none of these occurred below this age. The occurrence of bronchogenic carcinoma in a pulmonary nodule below the age of thirty-five years is possible but very rare. Other malignant nodules, a bronchial adenoma and metastatic nodules, occurred in three patients below the age of thirty-five years.

Statistically the granulomas predominate below the age of thirty-five years, but may be found in any age group even in the seventh decade.

Symptoms of pain, hemoptysis, cough or fever were present in forty-one of sixty-two patients having bronchogenic carcinoma or 69 per cent, and twenty-seven of sixty-seven patients in the granuloma group or 40 per cent. Four of the patients in the granuloma group had hemoptysis.

Inasmuch as symptoms were not present in 30 per cent of the patients with bronchogenic carcinoma, an asymptomatic lesion cannot even be remotely considered as benign. As a matter of fact, much of the early detection and the improvement of the results of surgical removal of carcinoma depend on finding the malignant nodule in an early silent phase.

One hundred forty-four operative procedures were done for 180 pulmonary nodules. There was no surgical mortality. Careful attention to the principal of preservation of lung tissue is evi-

denced by the fact that segmental resection was possible in sixty-three patients, including six with bronchogenic carcinoma, one with a metastatic nodule, and two with bronchial adenoma. Eight of the ten benign tumors were removed by segmental resection, as were forty-four of the fifty-four inflammatory lesions, including all but seven of the granuloma group. Lobectomy was necessary for fifty-three of the malignant tumors and ten of the inflammatory group. Thirteen pneumonectomies and two exploratory thoracotomies were done, all in the group of malignant nodules (Table IV).

TABLE V. SURVIVAL FOLLOWING RESECTION OF 37 SYMPTOMATIC PULMONARY NODULES DUE TO BRONCHOGENIC CARCINOMA

| PERIOD SINCE RESECTION | NUMBER OF RESECTIONS | NUMBER ALIVE | PERCENT SURVIVING |
|------------------------|----------------------|--------------|-------------------|
| Less than 1 year | 13 | 12 | 82 |
| 1 year | 9 | 6 | |
| 2 years | 2 | 2 | 40 |
| 3 years | 3 | 0 | |
| 4 years | 4 | 1 | |
| 5 years or more | 6 | 3 | |
| TOTAL | 37 | 24 | 65 |

Justifiable criticism was made recently by Hodgson²⁰ of the lack of follow-up studies concerning patients with malignant pulmonary nodules for which resection had been performed. The data to date concerning the survival rates of fifty-six patients whose bronchogenic carcinoma presenting as a pulmonary nodule was resected are presented in Tables V and VI. The patients were divided according to the presence or absence of symptoms because theoretically the latter group should have a better survival rate.

Resections were done in thirty-seven patients in the group of pulmonary nodules due to bronchogenic carcinoma with symptoms. There were no hospital mortalities. Twenty-four of the thirty-seven patients or 65 per cent have survived. Six of the fifteen patients whose carcinoma was resected over two years ago are alive, a survival rate of 40 per cent for this period. Three of the six patients whose carcinoma was resected over five years ago are alive five, six and ten years, respectively.

Resections were done in nineteen patients hav-

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ing a pulmonary nodule caused by bronchogenic carcinoma without symptoms. There were no surgical mortalities. Fifteen or 80 per cent of these nineteen patients have survived. Seven of the ten patients whose resection was done two or more years ago are alive, a survival rate of 70 per cent for this period.

The combination of the results of resection for both the symptomatic and asymptomatic group of pulmonary nodules due to bronchogenic carcinoma reveals thirteen or twenty-five patients alive or a 50 per cent survival rate for resections done over two years ago (Table VII). Enough time

TABLE VII. SURVIVAL RATE FOR THE ENTIRE GROUP OF PULMONARY NODULES DUE TO BRONCHOGENIC CARCINOMA WITH OR WITHOUT SYMPTOMS

| PERIOD SINCE RESECTION | NUMBER OF PATIENTS | NUMBER ALIVE | PERCENT SURVIVING |
|------------------------|--------------------|--------------|-------------------|
| Less than 1 year | 20 | 18 | 84 |
| 1 year | 11 | 8 | |
| 2 years | 7 | 6 | 50 |
| 3 years | 4 | 1 | |
| 4 years | 7 | 3 | |
| 5 years or more | 7 | 3 | |
| TOTAL | 56 | 39 | 70 |

TABLE VI. SURVIVAL FOLLOWING RESECTION OF 19 ASYMPTOMATIC PULMONARY NODULES DUE TO BRONCHOGENIC CARCINOMA

| PERIOD SINCE RESECTION | NUMBER OF RESECTIONS | NUMBER ALIVE | PERCENT SURVIVING |
|------------------------|----------------------|--------------|-------------------|
| Less than 1 year | 7 | 6 | 90 |
| 1 year | 2 | 2 | |
| 2 years | 5 | 4 | 70 |
| 3 years | 1 | 1 | |
| 4 years | 3 | 2 | |
| 5 years or more | 1 | 0 | |
| TOTAL | 19 | 15 | 79 |

has not elapsed to evaluate five-year survival rates in a significant number of patients. Six of fourteen patients operated upon four or more years ago are alive, a survival rate of 43 per cent for this period.

It would appear from the statistics available that resection for the malignant nodule due to bronchogenic carcinoma yields a satisfactory survival for periods over two years at least.

Discussion

The importance of the pulmonary nodule lies in the fact that a high percentage of these lesions are malignant, in this series 43 per cent. The surgical mortality for resection of the pulmonary nodule is very low, and the results of resection for those nodules due to bronchogenic carcinoma indicate a satisfactory long-term survival rate. The general policy of prompt exploratory thoracotomy for diagnosis as well as the treatment of an indeterminate pulmonary nodule is on a sound basis. The burden of proof in the individual case is on the shoulders of the person who says a particular

lesion is benign and does not require surgical removal for diagnosis and treatment.

There is good reason for further attempts to outline diagnostic criteria which may be used justifiably to delineate the individual problem. In general, the age of the patient and certain roentgenographic and laboratory information may be of assistance.

Age

In this series of pulmonary nodules there were only three malignant nodules in persons below the age of thirty-five, two metastatic nodules and one adenoma. There were no bronchogenic carcinomas in persons under thirty-five. In this same age group there were sixteen granulomas. It would appear safe to say that below the age of thirty-five years a pulmonary nodule has an overwhelming chance of being a granuloma, and that if it is malignant, it will be metastatic or an adenoma. Bronchogenic carcinoma begins to appear in the age from thirty-five to forty years and beyond this age the incidence of malignancy increases from 43 per cent in the fifth decade to 64 per cent in the seventh decade.

Roentgenographic Criteria

The size and density of the lesion may be of significance, relatively speaking. Vivas and Crabtree²¹ found that lesions of medium and small size of light density should be considered malignant (Fig. 1), that lesions of medium and small size of medium density should be studied carefully, and that lesions of heavy density are not likely to be malignant. The larger lesions are more likely to be malignant, although mesotheliomas and hamartomas may attain large size before being found (Fig. 2).

PULMONARY NODULE—PAULSON

Rigler²² has called attention to a new sign of malignancy of the pulmonary nodule, consisting of notching or umbilication of a border of the shadow (Fig. 3). It would appear that this sign

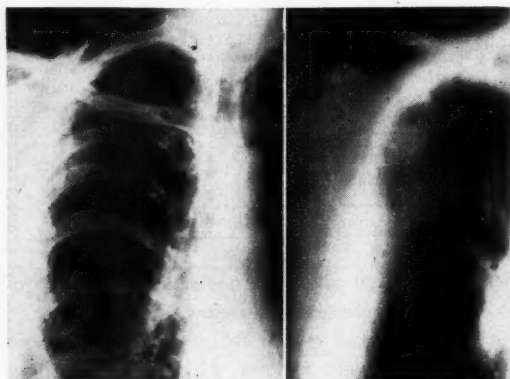


Fig. 1. Pulmonary nodule of medium size and light density in the right lung. Plain roentgenogram and planigram. Proven bronchogenic carcinoma.

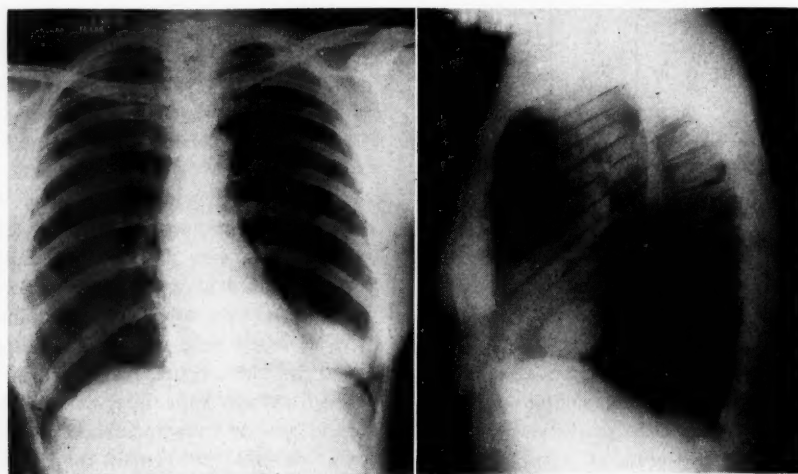


Fig. 2. Mesothelioma, aysmptomatic, found on roentgenogram made in survey.

is of relative value, being significant by its presence but not by its absence. It may be produced by other lesions, particularly by a coccidioidal glauuloma.

Lamination, calcification or a surrounding halo all are in favor of the diagnosis of a granuloma or a benign lesion. Planigraphic films are necessary for proper evaluation and one must be sure that what is seen in the roentgenogram is truly calcium and that it does lie in the mass (Fig. 4). Bloch²³ has shown that the degree of calcification

in the roentgenogram is arbitrary and dependent on special techniques for demonstration. The Mayo Clinic group¹⁷ found calcification by planigraphic techniques in the benign nodules only. On the other hand, Tuttle,²⁴ May, Rose and Dugan,¹⁸ and Hodes²⁵ report several cases in which nodules containing calcium proved to be malignant. We have seen a similar patient in whom surgery was deferred because of apparent calcification within a pulmonary nodule, to be embarrassed by return of the patient at a later date with cerebral metastases from the adenocarcinoma responsible for the nodule. It would appear that the presence of calcium favors benignancy but at best is a relative criterion and is not sufficient evidence alone to prevent the patient from having the benefits of removal of the lesion and histologic examination.

From a diagnostic standpoint, the presence of calcium on roentgenographic examination does not warrant unlimited assurance. Some lesions, such as granulomas, with a high calcium content

may be soft and caseous and therefore capable of progression and spread. Multiple areas of rarification within a granulomatous process may represent areas of activity and thus contraindicate delay. Calcification should probably be considered safe only if it occurs in a solid, uniform manner.

Previous chest films may be of importance in demonstrating the lesion to be of long standing and hence less likely to be malignant. However, several cases of malignant nodules are on record that have been present unchanged for a period of years.

Limitations of Laboratory Procedures

Many laboratory procedures are available for the study of pulmonary nodules, but availability alone does not justify prolonged and expensive pre-operative examinations of the patient. The peripheral location of the pulmonary nodule makes most important available diagnostic aids ineffective.

Bronchoscopy is seldom indicated or justified in a patient with a pulmonary nodule unless he has symptoms suggestive of an associated bronchial lesion. Cytologic examination of the sputum or bronchial secretions for malignant cells is of value

those with benign lesions. There is little justification for bacteriologic examination of the sputum of a patient with a solitary pulmonary nodule. Certainly there is no justification for waiting



Fig. 3. Notching or umbilication of a border of a pulmonary nodule due to bronchogenic carcinoma.

only if a positive result is obtained. A negative examination does not rule out malignancy. For the most part, a pulmonary nodule is unfavorably located for the exfoliation of malignant cells.

Skin tests to determine the patient's sensitivity to tuberculin, histoplasmin or coccidioidin are at best inconclusive regarding the precise nature of the nodule. A positive reaction does not indicate that the nodule in question is responsible (Fig. 5). A series of negative reactions increases the suspicion of neoplasm. Some patients with a negative reaction may have a granuloma.

The sedimentation rate is frequently elevated in patients with malignant lesions but usually not in

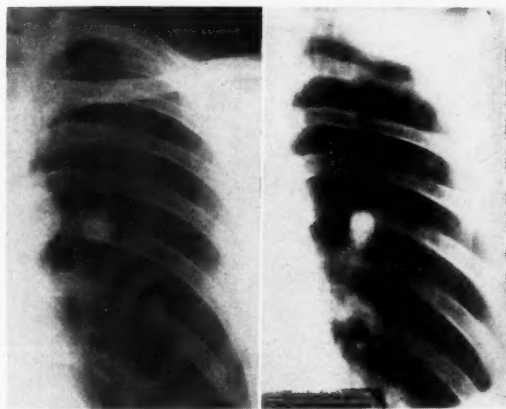


Fig. 4. Plain roentgenogram and planigram revealing calcium in a pulmonary nodule.

weeks for the results of a culture.

We believe that proper evaluation of a patient with a pulmonary nodule consists almost entirely of the use of roentgenographic techniques to include planigraphic films, survey of the patient from a general standpoint, and unless contraindicated, prompt surgical removal and histologic examination. The age of the patient and the roentgenographic appearance justified referring surgery in only 13 per cent of the patients in this series.

Metastatic Nodules

Knowledge of a malignancy elsewhere in the body or the history of a previously removed cancer is suggestive evidence of the metastatic nature of a pulmonary nodule but is by no means conclusive. Multiple primary cancers in unrelated systems can and probably will occur more frequently as survival rates improve. The appearance of a pulmonary nodule in a patient with a known cancer primary in another site may indicate the presence of a new primary cancer of the lung. Cahane²⁶ has reported only eighteen solitary metastases in the lungs during a period when 64 separate primary cancers of the lung were found at Memorial Hospital in patients with cancer at another site. This indicates a $3\frac{1}{2}$ to 1 chance that a solitary pulmonary shadow is a separate primary lung cancer rather than a solitary metastasis in Memorial Hospital. One patient in our series has survived

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ten years following the removal by segmental resection of a primary adenocarcinoma of the lung occurring five years after the treatment of an epidermoid carcinoma of the cervix.

testis (Fig. 6). The nodule was removed and proved to be a hamartoma.

Synchronous cancers may occur in different organs and need not contraindicate surgery. In gen-

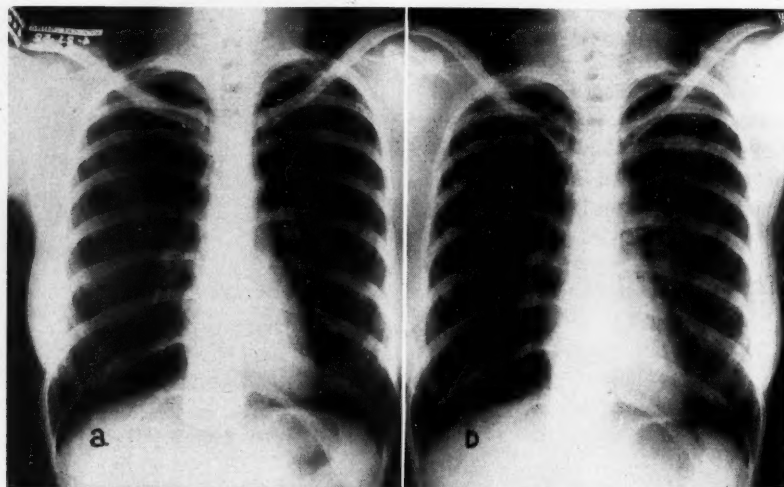


Fig. 5. (a) Pulmonary nodule, left upper lobe, interpreted as due to tuberculosis because of a positive tuberculin skin test and old scars in the contralateral lung.

(b) The same nodule ten months later, increased in size. Pneumonectomy was necessary at this time for an adenocarcinoma with extensive hilar and mediastinal metastases.

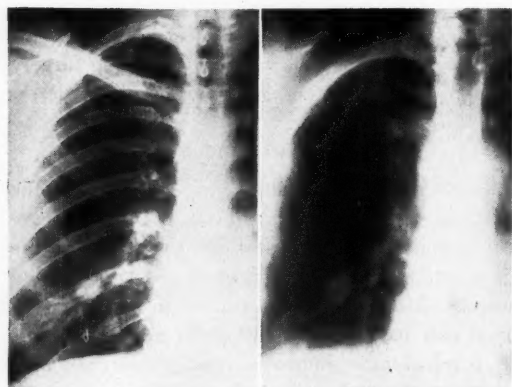


Fig. 6. Plain roentgenogram and planigram revealing pulmonary nodule in right lower lobe. Known seminoma of the testis. Excision of the nodule proved to be a hamartoma.

A benign tumor or a granuloma may likewise account for a pulmonary nodule in a patient with a known primary cancer in another site. Illustrative of this fact is the case of a thirty-six-year-old man who was found to have a pulmonary nodule shortly after the removal of a seminoma of the

eral, the more malignant lesion should be treated first. In most cases this will be the pulmonary lesion.

The mere presence of a pulmonary nodule does not justify exhaustive examinations in a blind search for a primary malignancy without any other indication that such a lesion is present. The removal of the pulmonary nodule alone will establish its true nature and if metastatic, frequently indicates the site of the primary tumor.

Those persons thought to have a metastatic pulmonary nodule should have planigraphic roentgen examinations done because multiple nodules may not be apparent in roentgenograms done by the usual techniques.

Granulomas

The resection of a pulmonary nodule due to granuloma is most often advised because it is often indistinguishable from a malignant nodule. This is true of all types due to tuberculosis, histoplasmosis, and coccidioidomycosis, particularly the last (Fig. 7).

One may also justify the resection of granulomas

on the basis that these lesions are potentially dangerous from the standpoint of progression. Mitchell²⁷ has shown that after prolonged observation, there is about one chance in four of progression of disease when pulmonary tuberculosis is characterized by solitary dense circumscribed foci (tuberculomas) and has been treated without chemotherapy, resection or permanent collapse. Mathers²⁸ made a similar observation concerning twenty-three tuberculomas observed for from five to ninety months. Three tuberculomas cavitated with bronchogenic spread, four cavitated only, and five enlarged.

Matthiesen²⁹ has called attention to the surgical significance of solitary circumscribed lung nodules in histoplasmosis and states that surgical resection of pulmonary lesions is good treatment in the management of such localized histoplasmosis infections.

Summary

1. The importance of the pulmonary nodule lies in the fact that of 897 cases collected from the literature, 323 or 36 per cent were malignant.

2. The author's series of 180 patients having pulmonary nodules and ranging in age from six to eighty-one years has been reviewed. Eighty per cent of these patients were operated upon and the diagnosis proven pathologically. There were no surgical mortalities. The diagnosis could be made reliably on a clinical and roentgenographic basis in 13 per cent, and the lesions could not be classified in the remaining 7 per cent.

3. There were sixty-two patients with bronchogenic carcinoma or 34 per cent, seven with metastatic nodules or 4 per cent, and nine with bronchial adenomas or 5 per cent of the total. Forty-three per cent were malignant nodules. Only ten patients or 6 per cent of the total had true benign tumors.

4. The pulmonary nodule was produced by inflammation in seventy-four patients or 41 per cent of the total. Sixty-seven or 37 per cent of the total were classified as granulomas.

5. The age distribution revealed seven malignant nodules in forty-one patients under the age of forty years, an incidence of seventeen per cent. There were no bronchogenic carcinomas below the age of thirty-five years although there were two metastatic nodules and one adenoma below this age. The incidence of malignancy increases from

43 per cent in the fifth decade to 64 per cent in the seventh decade.

6. The results of resection for pulmonary nodules due to bronchogenic carcinoma indicate a

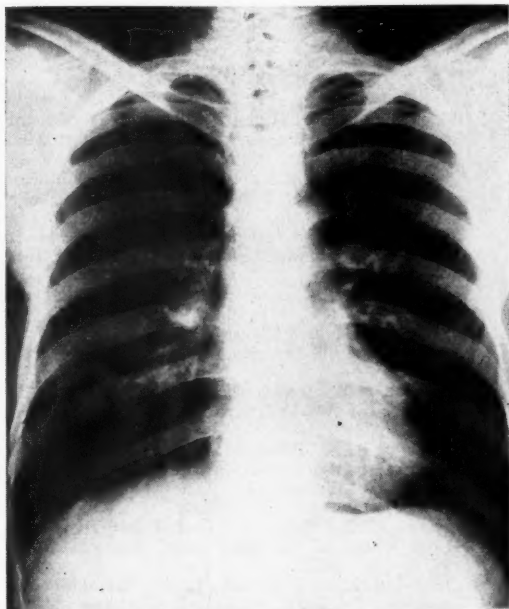


Fig. 7. Pulmonary nodule of medium size and soft density. Excision and examination revealed a coccidioidal granuloma.

40 per cent survival rate for two years or more for the lesion with symptoms and a 70 per cent survival rate for the same period for the same lesion without symptoms.

7. The policy in general of prompt exploratory thoracotomy for the diagnosis and treatment of an indeterminate pulmonary nodule is on a sound basis.

8. The proper evaluation of a patient with a pulmonary nodule consists of the use of roentgenographic techniques to include planigraphic films, survey of the patient from a general standpoint, and unless contraindicated, prompt surgical removal and histologic examination. Extensive laboratory examinations are unjustified as inconclusive.

9. Resection of an apparent metastatic malignant nodule should be considered because of the possibility of the lesion being a separate primary lung cancer or a benign lesion, as well as for the opportunity of longer survival following the removal of a known metastasis.

10. The resection of a pulmonary nodule due to granuloma is usually done because it is indistinguishable from a malignant nodule. It is also justified on the basis that some of these lesions are potentially dangerous from the standpoint of progression.

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REHABILITATION OF TUBERCULOUS PATIENTS

"It's not what you are but what you may become that counts." This is the motto of the Minnesota Vocational Rehabilitation counselors. In addition to many other services, the counselors help prepare tuberculous patients for normal, productive living.

"More than 50,000 men and women who have recovered from active tuberculosis have been trained for work and placed in a great variety of paying jobs by the State-Federal program for vocational rehabilitation since 1935," says a release from the state Christmas Seal organization.

Minnesota Vocational Rehabilitation trained eighty-three recovered tuberculous patients for jobs in 1954. Their estimated annual earnings were \$220,312.

"Rehabilitated workers pay back \$10 in income taxes for every federal dollar spent on their rehabilitation," according to Ben Brainerd, director of Minnesota Vocational Rehabilitation.

Recovered tuberculous patients are often safer and more satisfactory employees and coworkers than those who have never been disabled. They have been taught to guard their health and report for regular tuberculosis check-ups. They are less likely to infect others than the apparently healthy person who does not receive regular medical examinations and who may have tuberculosis without knowing he is ill.

Employers have discovered that rehabilitated workers are absent from the job no more than workers who have no physical handicap. They do not jump from job to job. They have fewer disabling accidents on the job than do other employees.

"When a tuberculous patient has properly recovered, received training, and is placed in the right job, he can do that job as well as anybody," the release from the Minnesota Tuberculosis and Health Association concludes.

Laryngocele—Laryngeal Air-Sac of Lower Animals Appearing in Man

Report of Three Cases

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THIS paper reports three cases of laryngocele and briefly reviews pertinent literature. A laryngocele is an air-sac lying in the neck near the larynx and connecting with the laryngeal lumen, usually through the laryngeal ventricle. This air-sac is a vestigial remnant of a structure found in many lower animals (Fig. 1). In some animals it functions as an accessory reservoir of fresh air.

One of the earliest reports of laryngocele was written in 1829, by Larrey,^{2,3} a French army surgeon in Cairo. He found the condition in Koran chanters who strained their voices from minaret tops calling the faithful of Mohammed to prayer. Larrey also found the condition in two army officers who had shouted loudly for years. The term "laryngocele" was introduced in 1867 by Virchow.^{4,5} In 1910, Von Hippel⁶ found twenty cases in the literature. Eight of these were discovered postmortem. Von Hippel believed that the cases reported by Larrey in Koran chanters were not true laryngoceles in many instances or the condition would be seen more often among those using their voices to excess. He believed Larrey's cases must have included cystic goiters and dilated jugular veins; otherwise many Wagnerian opera singers and itinerant fish peddlers would have laryngoceles. Laryngocele is in fact a very rare clinical entity. Freedman⁸ and Lothrop⁷ discuss laryngopyoceles and report cases much like our Case 2.

Additional reports of similar cases have appeared occasionally in the literature in recent years. These include reports by Jackson,¹⁵ McLaurin,¹⁶ Harrison and Lawson,¹⁷ Butler,¹⁸ Horowitz,¹⁹ Black,²⁰ O'Keefe,²¹ Keim and Livingstone,²² Hoover,²³ Meda,²⁴ Hill and Kipen,²⁵ and Mays.²⁶ These case reports make interesting reading, and their infrequency testifies to the rarity of laryngocele. They are not reviewed in detail because

our own case reports happen to cover the variations in types of laryngocele quite completely.

Laryngoceles are thought to be congenital, or to be acquired by overdistention of the airway

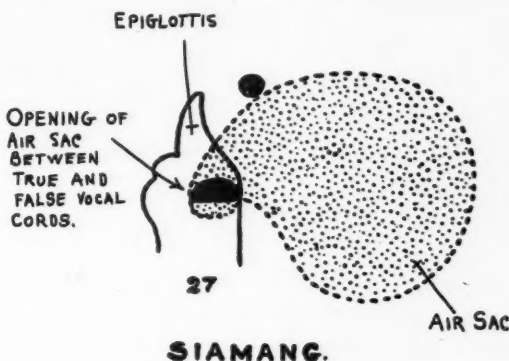


Fig. 1. Lateral view of larynx of lower animal showing laryngeal air-sac opening into the laryngeal ventricle. Some lower animals use these sacs as accessory air reservoirs. (From *Comparative Anatomy of the Larynx* by V. E. Negus. New York: Grune and Stratton, 1949).

during overexertion. Evidence supporting either view can be found. Reports of laryngoceles occurring in children of one to thirteen years of age support the theory of congenital origin. In fact, Kan^{9,10} said he had seen distention of an air sac tumor in a sixteen-day-old infant cause asphyxiation. He said the sacs on both sides remained distended after the larynx was removed postmortem and only when they collapsed after being sectioned did he realize the nature of the tumor. The concept of a "blow-out" theory for the formation of laryngoceles is outlined below.

In man during strenuous muscular activity such as pulling, pushing, lifting, straining and during defecation or parturition, the upper end of the trachea is closed by two sphincters lying one above the other. The upper sphincter is formed by the false cords and the muscles which adduct

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them; the lower sphincter is formed by the true vocal cords and the muscles which adduct them.

The laryngeal ventricles are "alcoves" located to the side of the main laryngeal cavity. They open into the laryngeal airway between the upper

formation of a laryngocele. The experiments of Monselles,^{11,12} (Florence) in 1900 seem to support such a view. He attempted to produce eversion of the ventricle artificially in thirty-three cases after death without success. In every case the

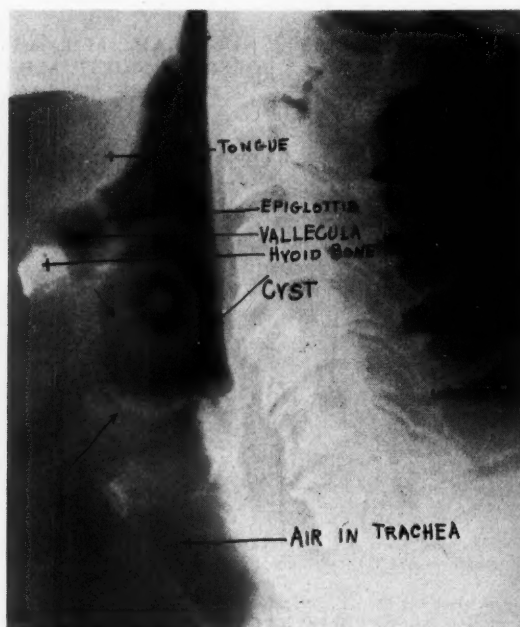


Fig. 2. (Case 1) Lateral view of the soft tissues of the neck showing air-filled cyst lying between the upper end of the larynx and the hyoid bone and projecting into the air-filled pharynx.

and lower sphincters. The sacculus of the larynx is a small pouch connected to the superior portion of the ventricle. In activity requiring glottic closure, the air pressure may be transmitted to the ventricle and sacculus because the true cord sphincter is weaker than the false cord sphincter; as the pressure in the tracheo-bronchial tree increases the lower laryngeal sphincter may be forced open. The laryngeal ventricle and sacculus can then be distended.

Some activities involve general increase in pressure throughout the airway but do not entail glottic closure of the degree just described. These include sneezing, nose blowing, coughing, glass blowing and the playing of certain wind instruments.

Perhaps the presence of a congenital sac attached to the side of the laryngeal airway plus a force to distend that sac are necessary to the

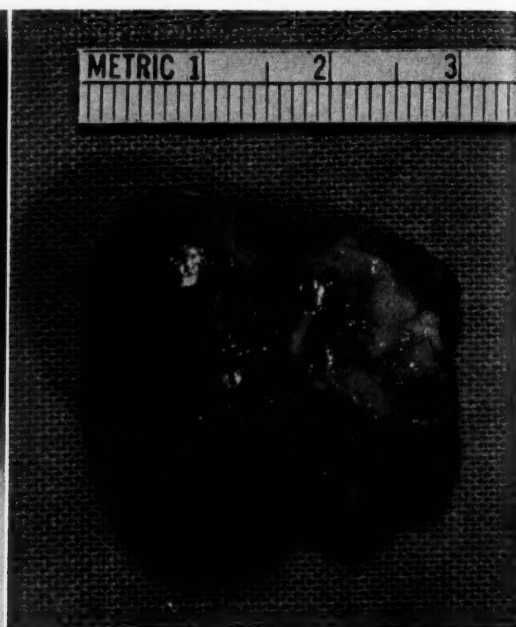


Fig. 3. (Case 1) Photograph of surgical specimen from Case 1 showing the air-filled sac, still intact, after removal from the patient's neck.

mucous membrane instead of the submucosa was torn on attempting to draw out the lining of the ventricle.

Laryngocele in man is divided into three classes by Lindsay¹³ and by Allmans and Cordray.¹⁴

1. Internal laryngocele—a cystic dilatation within the larynx above the false cord extending to the aryepiglottic fold or base of the tongue (Freu). The cyst dilates on forced expiration; it deflates on quiet respiration. Hoarseness accompanies dilatation of the sac (see Case 1).

2. Superior external laryngocele—a cystic dilatation of the sacculus of the ventricle that penetrates the thyrohyoid membrane just above the superior rim of the thyroid cartilage and anterior to the superior cornu, or just lateral to the thyroid notch. It appears as a swelling of the neck and enlarges on cough and exertion. It can be emptied by external pressure. Distention of the sac produces discomfort and headache due to pressure on the large veins of the neck. Infection and accumula-

LARYNGOCELE—KUCERA AND PRIEST

tion of fluid in the sac is likely to produce coughing and expectoration of pus when the sac is compressed.

3. A combination of (1) and (2); (see Case 2).

4. A fourth type has been described as inferior external laryngocele, but verification of this type by dissection or operation appears to be lacking.

area of lessened density just above the right ventricular fold represented the laryngocele (Fig. 2). Planograms showed a large air-filled cyst filling the lumen of the larynx above the level of the ventricular folds and attached on the right. The possibility of an associated tumor was not excluded.



Fig. 4. (Case 2) Anteroposterior view of soft tissues of the neck showing laryngocele on the right side. The upper portion of the sac is filled with air and the lower portion with fluid. The fluid is forced into the airway by movements of the neck causing cough.



Fig. 5. (Case 2) Lateral view showing the same structures as described in Figure 4.

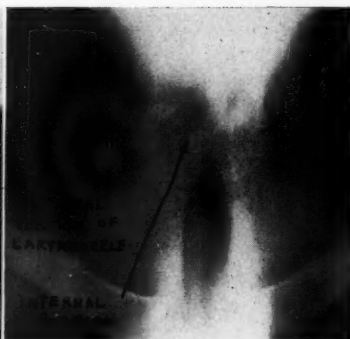


Fig. 6. (Case 2) Planogram of the neck in a posteroanterior view showing the combined internal and external laryngocele. As contrasted to the plain film shown in Figure 4, Figure 6 shows the inferior limits sac.

The symptoms of laryngocele will be noted in the reports of our cases. Cases 1 and 3 are examples of the internal type, while Case 2 is a combination of the internal and external types.

Case 1.—Mr. R. O. B., aged sixty-three years, was first examined by us in 1952. For the previous two months foods such as bread and meat had caught in his throat during swallowing. His wife said that he made a great noise when sleeping. This was not a typical snore but seemed to originate from a site in the lower pharynx. Other symptoms included hoarseness, cough, weight loss and marked sleepiness. The hoarseness grew worse as each day progressed, and the cough was non-productive but seemed to be due to irritation and not to excessive secretion within the respiratory tree. The man's weight had decreased 15 pounds in six months. There was no pain or dyspnea.

Indirect laryngoscopy revealed a large cyst on the right side of the larynx. It is interesting to note that the description of our case is the same as one described by Kistner in 1924.¹⁰ He said, "Indirect inspection of the larynx revealed a large, smooth tumor obliterating the right aryepiglottic fold, bulging out toward the median line, obscuring any view of the right cord, ventricular band or arytenoid. The left arytenoid and its vocal process could be seen and were normal in appearance. The anterior two-thirds of the left cord could not be seen."

General physical examination showed no significant abnormality. In the ordinary films of the neck a rounded

Tracheotomy under local anesthesia was carried out to assure patency of the airway during manipulation of the laryngeal cyst. When the incision was made into the trachea there was a sudden fall in blood pressure. Cocaine reaction or the curious syndrome exhibited by some patients having chronic hypoxia were considered as possible causes. Cocaine in a four per cent solution had been injected into the tracheal lumen a few minutes before opening the trachea. The patient's long standing sleepiness could have been due to chronic hypoxia. Nevertheless the removal of the laryngeal cyst was deferred for a few days.

Then a thyrotomy was done. The right ventricular fold was seen to be filled by a cystic mass. The soft tissues of the false cord were split along the cut edge and the mucosa peeled from the medial side of the cyst. The cyst was then shelled out carefully. The deep tissues of the ventricular band were separated from the thyroid cartilage and the cyst was delivered intact (Fig. 3). It contained air and floated in normal saline. The cyst was $2\frac{1}{2}$ by $2\frac{1}{2}$ by 3 cm. The wall was thin and on section the cyst was filled with air and mucus. The inner surface was smooth and was lined with normal appearing ciliated columnar epithelium. Within the wall of the cyst there were normal appearing mucus glands. The pathologist confirmed our diagnosis of laryngocele. The patient tolerated the procedure well and had an uneventful recovery.

Case 2.—Mr. C. L., aged thirty-six, complained of hoarseness of two months' duration and of a lump on the right side of his neck just above and lateral to

the thyroid ala. His physician aspirated air and fluid from the mass in the neck. Subsequently he developed a secondary infection and fever. He responded to antibiotics but complained of a bitter discharge into his throat periodically. Planograms and plain posteroanterior and lateral x-rays of the larynx revealed a very large

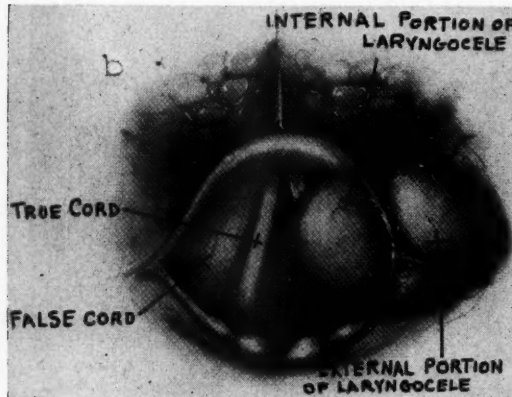


Fig. 7. (Case 2) Drawing of the view obtained with a mirror in Case 2 except that this figure shows a left-sided laryngocele, while our case was right sided. (From W. B. Hoover: *Laryngocele. Surgical Clinics of North America*. Philadelphia: W. B. Saunders, 1952.

internal and external laryngopyoceles partially filled with fluid and occupying the right side of the neck (Figs. 4, 5, 6). Indirect laryngoscopy showed a rounded mass protruding above the larynx at the level of the epiglottis (Fig. 7). The epiglottis was pushed sharply to the left.

At surgery a horizontal incision was made from the right sterno-mastoid muscle to the midline at the level of the hyoid bone. This was directly over the center of the mass. The skin, superficial fascia, platysma and deep fascia were divided. Under the deep fascia a cyst wall was visualized. It was picked up carefully and dissected out from its bed. The bed consisted of the hyoid bone and its attached muscles; the cyst passed the midline and at this time it was dissected off of the pharyngeal mucosa. It extended caudad for a distance of about 6 cm. and was dissected out until its attachments disappeared at its anterior medial end under the right ala of the thyroid cartilage just lateral to the thyroid notch. The entire structure at this point was not over 1.0 mm. in diameter. A midline incision extending from the thyroid notch down to the suprasternal notch was made. A tracheotomy was then done. The thyroid alae were separated from one another using an electric saw. On looking for the cut end of the sac it couldn't be found, but there was an opening in the midline at the point where the sac had been. This represented the retracted end of the sac where it attached to the patient's laryngeal ventricle. The opening was exactly opposite to the other laryngeal ventricle. The sac had already been completely removed, but we had not realized it and opened the larynx in the mid-

line expecting to find the stub end of the cyst. The total volume of the sac was 120 cc. It was filled partially with a thick whitish fluid.

The cyst measured 5 by 3 by 2½ cm. The wall was thin and the lumen was filled with a cloudy mucus. Microscopic examination showed the cyst to be lined by respiratory tract epithelium. Beneath the epithelial lining were normal appearing mucus glands and evidence of recent hemorrhage into the fibrous connective tissue. The diagnosis was laryngocele. The patient tolerated the procedure well. For many months he had paralysis of his right vocal cord. This recovered completely.

It is not easy to believe that this man's cyst arose from forcible over-distention of a normal laryngeal ventricle. It must have been a congenital anomaly, probably a vestigial air-sac, and became distended when the tract connecting it to the larynx opened up, possibly due to coughing or straining.

Case 3. J. B. G., a seventy-four-year-old man, had slight hoarseness and was examined to rule out laryngeal cancer. The findings on physical and x-ray examinations were exactly like Case 1, but the cyst was small. This man had been observed from time to time for two years, and has no significant trouble. No surgery was necessary in this case. Laryngocele and cancer of the larynx have been reported in the same case by Schall.¹⁶

Summary

Three cases of laryngocele are presented, two of the internal type, the other a combination internal and external laryngocele. The history, anatomy, histology and etiology are reviewed.

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(Continued on Page 156)

Esophageal Hiatus Hernia

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SINCE the subject of esophageal hiatus hernia is extensive, we propose to discuss only that type of diaphragmatic hernia. Other types of diaphragmatic hernias present different problems and will not be considered.

A diaphragmatic hernia is found frequently during routine gastrointestinal x-ray examinations, occurring in between 1 to 2 per cent of these studies.¹ Of these, more than 98 per cent are of the hiatal variety.

There are several classifications of hiatus hernia, but that most commonly used divides these defects into four anatomic types. These four types are:

1. The congenital short esophagus with thoracic stomach, a rare condition.
2. The hiatal esophageal hernia with a shortened esophagus.
3. The esophageal hiatal hernia of the sliding variety. This is the most common type.²
4. Para-esophageal hernia through the esophageal hiatus.

In the latter two types, the esophagus is of normal length. In type 4, the esophagus remains fixed in the hiatus, the stomach herniating through the opening beside the esophagus. In this variety, the esophago-gastric junction remains below the diaphragm. In type 3, the lower end of the esophagus is not fixed, but withdrawn into the posterior mediastinum with a portion of the stomach. Here, the esophago-gastric junction is drawn up above the diaphragm. For practical purposes, types 3 and 4 will be considered together, since their differentiation is only of academic interest. In type 2, shortening of the esophagus is apparently due to scar contracture, a result of ulceration and esophagitis.

Since an accurate anatomic knowledge of the parts concerned is necessary in any hernia repair, brief mention should be made here of the normal hiatal structure and the basic faults found

in hiatal defects. Carey and Hollinshead² have shown that the normal diaphragm about the hiatus is formed from the right crus which splits into a deep and superficial layer. In a few cases, a few fibers from the left crus cross to the right over the aorta to form part of the right margin of the hiatus. This, however, is uncommon. The transversalis fascia of the abdominal wall is continued on to the inferior surface of the diaphragm as the diaphragmatic fascia. As it approaches the esophagus, it is called the diaphragmatico-esophageal fascia or the phreno-esophageal ligament. This ligament passes through the hiatus to insert in the lower part of the esophagus 2 or 3 cm. above the esophago-gastric junction. Enough strength and flexibility are present in this structure to resist traction of the stomach into the thorax and yet allow some movement of the cardia with swallowing and change of body position.

Carey and Hollinshead have pointed out that there are three basic defects present in hiatal hernia: (1) The first is a redundant peritoneal sac which extends through the hiatus and is located on the anterolateral aspect of the upper part of the stomach and the lower part of the esophagus. This sac does not pass all the way around the underlying organs. (2) The second basic defect is stretching of the phreno-esophageal ligament. (3) The third defect in hiatal hernia is distortion or weakness of the right crus, the muscular collar of the hiatus.

Symptoms and Complications

In hiatus hernia, symptoms may be mild and not particularly related to the size of the defect. Small sliding hernias may produce great distress. Often the manifestations are vague, but the disease should be suspected in patients with abdominal symptoms or persistent refractory anemia. Certainly, it is reasonable to think that a large number of so-called pseudo-cardiacs and air-swallowers actually are suffering from undiscovered hiatal hernias. In our own experience, the dis-

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ease has in several instances been mistaken for coronary heart disease.

A hiatus hernia syndrome has been described² consisting of: (1) a feeling of pain, fullness or distress in the epigastrium or substernal area, coming on at the beginning of a meal. It may be so severe that the patient has to stop eating. (2) When the patient gets up and walks about, symptoms suddenly disappear, and the patient can continue the meal. It has been said that this symptom complex practically permits a diagnosis of hiatus hernia.

Frequent symptoms are pain, distress, eructation, vomiting, dyspnea, palpitation, belching, and weakness. Substernal burning is not uncommon and may be due to esophagitis. We have seen several patients who have complained of burning pain in the neck, jaws, and ears. Incompetence of the so-called cardiac sphincter permits regurgitation of acid stomach contents resulting in sour eructations or acid regurgitations, and even esophagitis. Some patients note that bending over results in epigastric distress and the feeling of hot, sour fluid running down into the mouth. Because of the position of the esophago-gastric junction above the diaphragm and the loss of the natural sphincter action normally present at the hiatus, this latter symptom seems to be more characteristic of the sliding variety of hiatal hernia. Frequently, we encounter individuals who assert that lying down after a fairly large meal will almost certainly produce trouble, and often there is distress at night that is relieved by getting up and walking around.

Hemorrhage with secondary anemia is said to be quite common although we have seen this complication in only three patients. Peptic ulcer of the esophagus, due to regurgitant esophagitis, may occur and has been seen in one of our patients. Perforation with mediastinitis may result. If severe ulceration of the esophagus continues untreated, stenosis and cicatricial shortening of the esophagus may result. This end result may require dilatation of the structures, and some authors have even resorted to resection and esophago-gastrectomy.

The diagnosis may be suspected from the history. It must be finally made by the radiologist. Many technical points have to be considered in the roentgen diagnosis of hiatal hernia, and these will not be considered here. Of importance, however, is the demonstration of length of

the esophagus, position of the esophago-gastric junction and its relation to the diaphragm, and size of the hernia. Often, only the head-down position will reveal the defect. Large, irreducible hernias are detected easily, but the small ones are often quite difficult to demonstrate. For this reason, it is often advisable to repeat the x-ray examination in the event of negative findings when the clinical indications are typical. In one of our patients, three x-ray examinations were necessary before the hernia was finally discovered.

Esophagoscopy is of great importance. It is the only way to evaluate adequately the degree of regurgitant esophagitis. Every patient with an esophageal hiatus hernia who has a history of dysphagia or bleeding should be esophagoscoped. Some people feel that all patients with an esophageal hiatus hernia should have such an examination preoperatively. The endoscopist can provide the surgeon with valuable information, including a fairly accurate estimate of length of esophagus, a very important factor not always apparent in the x-ray examination. Lastly, esophagoscopy will rule out any unsuspected lesion such as carcinoma low in the esophagus or in the cardia, mucosal cyst or tumors, or diverticulum of the esophagus.

Patients with small hernias and minimal symptoms may be handled satisfactorily by medical management. This includes anti-acids, antispasmodics, and more frequent smaller bland feedings. We feel it is also important to elevate the head of the bed on one-foot blocks. For the obese patient, a reduction plan is most important.

In all cases, except in those patients with very large hernias or those with severe symptoms or regurgitant esophagitis, we try a period of conservative remedy. Many internists, who usually see these people first, seem to feel that such hernias, especially small ones, seldom produce symptoms and do not deserve surgical treatment. Nevertheless, those we see who come to operation have usually been on a plan of medical therapy without much success. It is the opinion of some surgeons that symptoms are really complications, and since all hernias should be repaired before complications develop, so should hernias of the esophageal hiatus. We have not assumed quite as radical a position, feeling that each individual, his symptoms and circumstances, requires partic-

ular consideration. Certainly, not every patient with hiatus hernia needs an operation.

If gastrointestinal symptoms are not sufficiently relieved by a conservative plan or if complications do arise, surgical correction is advisable and, at times, mandatory. Contraindications to operative relief are: (1) undue esophageal shortening, (2) obesity of marked degree, (3) a good chance of later pregnancies, (4) symptoms not certainly due to the hernia, (5) poor general condition of the patient. Absolute contraindications to the procedure are the very short esophagus with or without a stricture and the extremely obese patient who will not diet.⁴

Surgical repair may be by the abdominal or thoracic approach. One is afforded better visualization of the defect, the sac, and the esophagus by the thoracic approach, but, unfortunately, a thorough abdominal exploration is not so easily done. In our experience, a thoracic approach has been entirely satisfactory, and we prefer it in the majority of cases.

Our thoracic procedure has been generally patterned after that described by Allison⁵ with a few modifications of our own. The left chest is opened through the bed of the resected eighth or ninth rib. The inferior pulmonary ligament is divided, and the mediastinal pleura incised. A previously inserted nasal tube facilitates identification of the esophagus. The latter structure is mobilized together with the hernial sac and stomach. Some care must be exercised to avoid entering the right pleural space. A traction tape is passed around the esophagus to aid in maintaining reduction of the hernia later. A short incision is made in the left leaf of the diaphragm between the muscular and tendinous portions but avoiding incising the esophageal hiatus. Through this incision, the fingers of the left hand are passed, and then the fingers are thrust upward into the hiatus to identify and tent-up better the peritoneal sac. The latter is opened from above and is partially excised. It must be remembered that the sac does not encircle the viscus completely. Therefore, it cannot be excised as one does a redundant peritoneal sac in the repair of the usual inguinal hernia. The esophagus is then drawn downward by means of the traction tape which is passed through the esophageal hiatus; that is, through the opening in the sac and then back out through the incision in the diaphragm. The superior cut margin of the phreno-esophageal ligament, which,

as we mentioned earlier, had been part of the hernial sac, may then be sutured to either the thoracic surface of the diaphragm or the abdominal surface of the diaphragm. We have used both methods and find that the former is easier. A few interrupted silk sutures are used for this. The suturing of the phreno-esophageal ligament should maintain the reduction. Additional sutures may be placed between the cardia and the diaphragm from below as recommended by some authors.

The next and probably most important step is to identify and clean carefully the fibers of the right crus and to suture them behind the esophagus. Usually, two or three interrupted silk sutures suffice. This closure is made snug enough to allow the tip of the fifth finger to be inserted between the esophagus and the sutured crus. If one wants to be especially certain that harmful narrowing will not occur, the most superior suture next to the esophagus may be of chronic catgut. This will allow subsequent dilatations if the new hiatus is too tight. Finally, the incision in the diaphragm is closed with interrupted silk, the mediastinal pleura closed likewise, and the chest wall reconstructed. Three catheters are left in place for suction drainage for twenty-four to forty-eight hours. It should be mentioned that we rarely crush the phrenic nerve.

We have operated upon twenty-four patients for diaphragmatic hernia. Eighteen of these patients had esophageal hiatus hernias. Only one of these was of the para-esophageal type. Eight of these patients were males and ten females, a proportion not in accord with figures generally reported. Most of our patients were of the stocky, sthenic build, and several had been considered psychoneurotic following earlier examinations. One fifty-two-year-old woman complained of postprandial throat pain which was completely relieved by repairing her esophageal hiatus hernia.

Only five patients had esophagoscopy preoperatively, but esophagitis was found in four. One of these patients had a peptic ulcer of the esophagus with a refractory anemia which was cured by repairing his hernia.

A thoracic repair was performed in sixteen of the eighteen patients. Medical treatment had been given a thorough trial in all. There were no operative deaths, and the average postoperative hospital stay was only nine days. Complications

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Lymphosarcoma

Unusual Extranodal Primary Manifestations

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THE initial manifestation of lymphosarcoma, in the majority of cases, is enlargement of superficial lymph nodes. We wish to report four cases in which the primary symptoms arose in extranodal sites. A limited review of the literature indicates the relative rarity of lymphosarcoma in which the primary symptoms arise extranodally.

Lymphosarcoma may arise in any organ which contains lymphoid aggregates. At the New York Memorial Hospital¹ visible and palpable external glandular swelling contributed the first evidences of the disease in 65 per cent of 196 patients with this condition. Symptoms referable to the abdomen occurred in 17.5 per cent of cases. In 11.6 per cent, the first complaint concerned difficulties in the upper part of the respiratory tract. Thoracic symptoms were first to appear in only 3.6 per cent, and pain in bone occurred initially in 1.83 per cent. Systemic manifestations, including fever, sweating and loss of weight, are conspicuously absent until the late generalized stage of lymphosarcoma, in contradistinction to what happens in Hodgkin's disease.

One has only to read some of the older literature on disease of the lymph nodes to recognize the confusion that has existed in the terminology of the various types of lymphomas. For this reason, comparison of statistics concerning lymphosarcoma as it affects various organs, based on reports in the literature, is difficult.

During the past four years we have seen four patients in whom lymphosarcoma was first manifested by symptoms referable to extranodal sites. The organs involved were an extra-ocular muscle, the frontal bone of the head, the left lung and the

prostate gland. In three cases, the disease later became generalized.

Report of Cases

Case 1.—A white woman, fifty-seven years old, registered at the Mayo Clinic on January 17, 1949, complaining of a sensation of a foreign body in the left eye of approximately six months' duration. A firm mass was noted on the left eyeball at about the insertion of the inferior rectus muscle. It was known that the patient had had a moderate degree of hypertension for approximately fifteen years. In 1946 she had complained of two attacks of vertigo, and a cerebrovascular accident had been suspected. Blood pressure in 1949 was 210 systolic and 115 diastolic, expressed as millimeters of mercury. Except for moderate obesity, the physical examination disclosed nothing abnormal; adenopathy or splenomegaly was not noted.

On January 18, 1949, the inferior rectus muscle of the left eye was excised. It was found to contain a tumor which on microscopic examination was reported as being a lymphosarcoma of the lymphocytic type. Additional treatment consisted of the application of radium to the region of the left orbit on January 21 and 24, and April 26. After this, the patient noted diplopia when she looked down or to the left.

The patient was next seen on February 19, 1952, complaining of fatigue, apathy, loss of appetite and a non-productive cough. Physical examination disclosed mild hypertension, obesity and a cervical polyp, which was removed. There was no significant adenopathy or obvious recurrence of the left orbital tumor. A moderate number of erythrocytes were noted on microscopic examination of the urine. There was a mild degree of hypochromic anemia, and the erythrocyte sedimentation rate was 105 mm. in one hour (Westergren). Roentgenologic examination of the thorax showed changes consistent with the findings of multiple pulmonary metastasis (Fig. 1a). Because of the hematuria, excretory urograms were made which showed no evidence of renal neoplasm. Roentgen therapy to the thorax was employed; marked regression in the multiple nodular densities ensued (Fig. 1b).

In June, 1952, a tumor was noted in the right upper eyelid. This was treated with roentgen-ray irradiation in June, July and August, 1952.

A nodule in the right lower eyelid was treated with roentgen rays in November, 1953.

In April, 1954, a nodule in the left lower eyelid was treated with roentgen rays.

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Dr. Holland is a Fellow in Surgery, Mayo Foundation, and Dr. Merritt is from the Section of Medicine, Mayo Clinic and Mayo Foundation. The Mayo Foundation, Rochester, Minnesota, is a part of the Graduate School of the University of Minnesota.

In January, 1955, the patient noted a burning pain in the right posterior thoracic region. At this time roentgenologic examination of the thorax revealed four nodular lesions in the field of the right lung and two similar lesions in the field of the lower part of the left lung.

of increased venous pressure, pulmonary congestion, or edema of the ankle. The blood pressure was 122 systolic and 102 diastolic, in millimeters of mercury. The pulse rate was 124 per minute, and the electrocardiogram revealed delayed A-V conduction and left bundle-

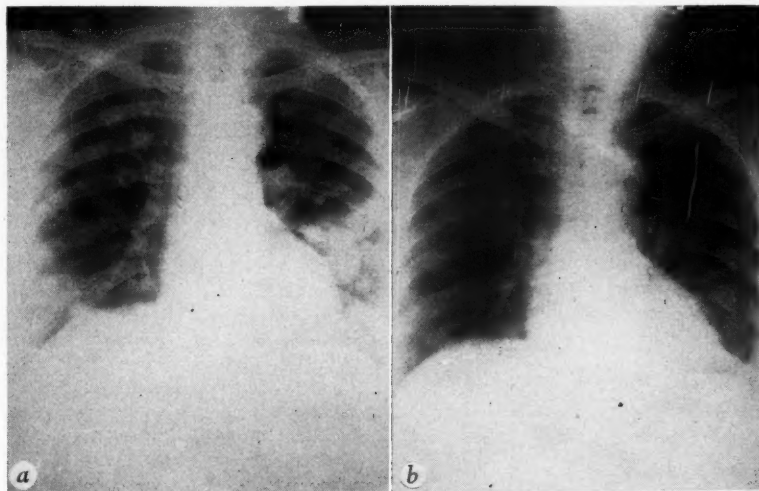


Fig. 1 (Case 1). (a) Thoracic roentgenogram on February 20, 1952, showing changes consistent with the presence of multiple pulmonary metastatic lesions. (b) Thoracic roentgenogram six months later, after roentgen therapy. Note clearing of lesions.

(Fig. 2). Roentgen therapy was again directed over the thorax. It is interesting to note that in spite of specific examination of superficial nodal areas, at no time has there been significant enlargement of lymph nodes.

Comment on Case 1.—In the group of patients seen at New York Memorial Hospital¹ the orbit was involved primarily in 0.5 per cent. Duke-Elder also mentioned lymphosarcoma in enumerating tumors involving the eye, without specifically mentioning the extra-ocular muscles.

Case 2.—A sixty-three-year-old farmer registered at the Mayo Clinic on January 6, 1955. His history was interesting in that he had been treated at the same clinic in 1936 for proved cervicofacial actinomycosis. The illness he had in 1955 had begun two months prior to his admission, when he had noted frontal headaches that were present day and night. Three weeks prior to this admission he had first noted three bony protrusions in the frontal area of the scalp, each approximately 1 cm. in diameter. One and a half years previously he had noted the onset of increased shortness of breath on exertion, and on one occasion he awoke at night feeling short of breath. There was no history of angina or edema of the ankles.

The bony protrusions in question were readily palpable over the frontal area of the skull. The heart was moderately enlarged, but there was no clinical evidence

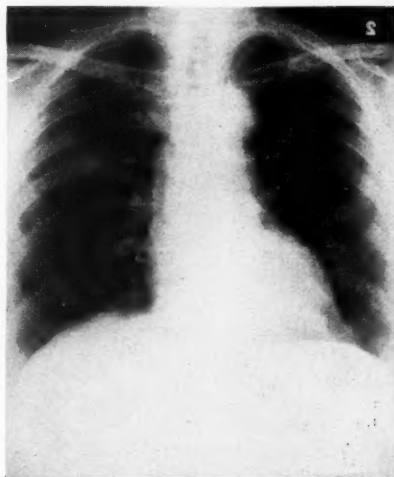


Fig. 2 (Case 1). Thoracic roentgenogram on January 21, 1955, showing recurrence of lesions in both lungs.

branch block. There was no significant lymphadenopathy and the spleen was not enlarged. Albuminuria was graded 3, and erythrocyturia, 2. Values for hemoglobin, erythrocytes and leukocytes were normal. The sedimentation rate was 21 mm. in one hour (Westergren). The value for urea was 64 mg. per 100 cc. of blood, and the reaction of the Kline test was negative.

A roentgenogram of the thorax showed cardiac enlargement; roentgenograms of the skull demonstrated destructive lesions of the frontal bone. Results of neurologic examination were negative. It was decided to obtain specimens of the lesions in the frontal bone

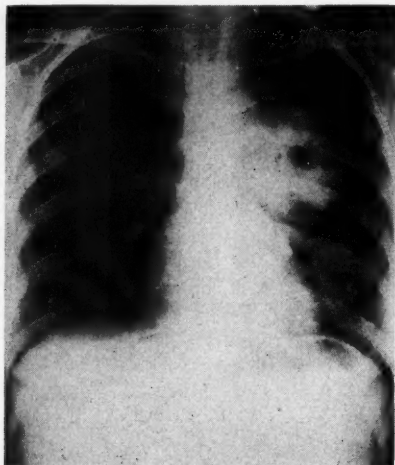


Fig. 3 (Case 3). Thoracic roentgenogram on April 5, 1954, showing extensive consolidation in the upper lobe of the left lung and multiple areas of cavitation.

for biopsy. After digitalis had been administered to the patient, a specimen of tissue was removed from one of the nodules on the frontal bone by Dr. R. H. Miller, of the Section of Neurologic Surgery. Biopsy demonstrated a picture consistent with the diagnosis of lymphosarcoma.

Roentgen-ray treatment was directed to the frontal region of the skull daily for ten days, after which the nodules disappeared and the headaches were relieved.

Two months later the headaches returned, with associated swelling of the left supra-orbital ridge. Because of the atypical nature of the bony involvement, sternal aspiration was performed and hypocellular marrow was obtained thereby. Malignant cells were not found, nor were multiple myelomas. A second course of roentgen-ray therapy consisting of ten treatments to the left frontal region was administered.

Within one week bony enlargement of the right supra-orbital ridge was noted, and it rapidly increased.

Within three weeks of the time of the last treatment massive bony enlargement of the right frontal region was evident, while the left side remained normal. The right eye was swollen shut. A third course of roentgen-ray therapy consisting of eight treatments was directed to the whole frontal area, including the orbital areas. After this, the swelling subsided and the pain disappeared.

Comment on Case 2.—Cortical or medullary involvement of bone is relatively common in the terminal stages of lymphosarcoma. However, in-

volvement of bone as a primary manifestation of the disease is relatively rare. The New York Memorial Hospital workers reported it as occurring in only 1 per cent of their cases. In the presence of lymphosarcoma the lesions are mostly osteolytic (85 per cent). Localized pain and tenderness are the most frequent clinical indications of lesions of bone in this disease.²

Case 3.—A thirty-nine-year-old white woman registered at the Mayo Clinic on April 5, 1954. She said that in January, 1953, an infection of the upper part of the respiratory tract had been followed by generalized pruritus and recurrent infections of the skin. Increased nervousness and fatigue gradually developed, and a cough started which was productive of purulent sputum, occasionally blood-streaked. Various antibiotic agents were administered, as well as vitamin B₁₂ and iron. At no time did the patient experience pain in the chest or dyspnea.

At the time of her admission she had lost approximately 8 pounds. The physical examination disclosed nothing abnormal. Roentgen-ray examination of the thorax showed changes considered to be those of extensive consolidation in the upper lobe of the left lung and multiple areas of cavitation (Fig. 3). There was a small patch of pneumonitis with central cavitation in the lingula. The value for hemoglobin was 10.6 gm. per 100 cc. of blood; erythrocytes numbered 4,010,000 and leukocytes 7,600 per cubic millimeter of blood. The erythrocyte sedimentation rate was 109 mm. in one hour (Westergren). The reaction to tuberculin skin tests was negative in first and second strengths. Microscopic examination of the sputum did not reveal evidence of tuberculosis or malignant cells. Subsequent culture of specimens of sputum gave negative results for tubercle bacilli as well as for fungi. Bronchoscopic examination showed purulent secretions exuding from the bronchus of the upper lobe of the left lung, but no evidence of obstruction.

The patient entered the hospital for a ten-day period of treatment with nebulized penicillin and streptomycin, as well as the parenteral administration of the same drugs. Roentgenograms of the thorax at the end of this period disclosed no appreciable changes in the appearance of the lesions in the lung.

On April 21, 1954, Dr. John W. Kirklin explored the left lung. The upper lobe was found to be massively involved with an inflammatory and cavitory lesion. There was also a similar but smaller lesion in the posterior, basilar segment of the lower lobe. Left pneumonectomy was performed. The surgical pathologist reported lymphosarcoma (Hodgkin's type) extensively involving the upper lobe and a small nodule of tumor in the lower lobe. In view of the apparent localized nature of the process, no further treatment was given. The patient was discharged from the hospital on the eleventh postoperative day.

The patient returned for re-examination on August 2, 1954. At that time there was no evidence of recurrence of the lymphosarcoma, and a roentgenogram of the

thorax showed no changes in the right lung. The pruritus had receded markedly.

In early January, 1955, the patient noted a dull, aching soreness in the left shoulder, extending into the neck and down the left arm to the elbow. The

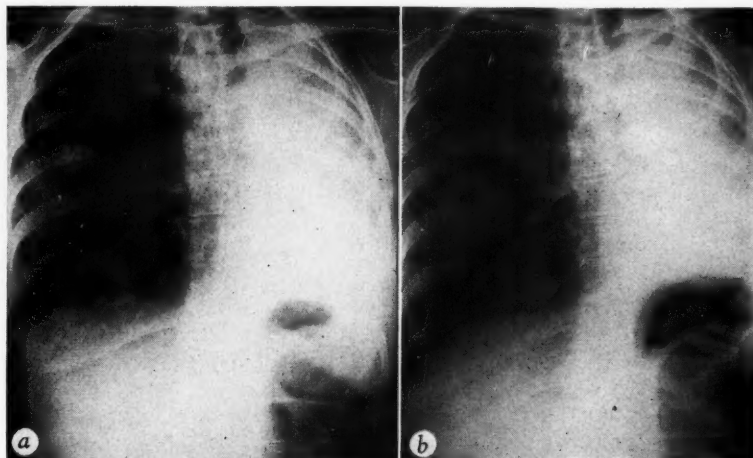


Fig. 4 (Case 3). (a) Thoracic roentgenogram on January 24, 1955, showing the results of left pneumonectomy and two nodular areas in the right lung. (b) Thoracic roentgenogram two months later, showing disappearance of nodules in right lung after roentgen therapy.

pruritus became more troublesome. The patient said that the consumption of any alcoholic beverages aggravated the pain.

She was seen again on January 21, 1955, and at this time the physical examination showed no significant abnormalities. A roentgenogram of the thorax showed the results of left pneumonectomy and two nodular areas in the right lung near the anterior ends of the first and third ribs (Fig. 4a). The latter were assumed to be caused by lymphosarcoma. Roentgen-ray therapy was administered to the thorax.

After this, the patient felt much improved until March 14, 1955, when she noted increased weakness, cough, low-grade fever and more intense pruritus.

She was again examined on March 28, and except for excoriations over the skin, nothing abnormal was found. Roentgenograms of the thorax showed that two nodular lesions in the right lung had disappeared (Fig. 4b). While there were no demonstrable focal areas of lymphosarcoma, it was felt advisable to administer nitrogen mustard. The patient received this form of treatment in her home city.

Comment on Case 3.—Primary lymphosarcoma of the lung has been reported infrequently in the literature; however, secondary involvement is not uncommon. The diagnosis when the process is primary in the lung is made only at the time of operation, and microscopic examination of removed tissue is then necessary.³⁻⁵

Case 4.—A thirty-two-year-old white farmer from Nebraska registered at the Mayo Clinic on June 28, 1951. He was admitted to a hospital the same day. His history was not significant, except that he had undergone hemorrhoidectomy elsewhere in March, 1951.

Three months prior to his admission he had noted the onset of frequent urination, day and night. These symptoms increased in severity, and a week prior to his admission he noted general malaise and felt an orange-size mass in the suprapubic region. He received a urinary antiseptic agent, and at the time of his admission the frequency of urination had diminished and the suprapubic mass had disappeared.

We found that the blood pressure was 140 systolic and 80 diastolic, in millimeters of mercury. There was evidence of some dehydration. Rectal examination revealed an ill-defined mass in the region of the prostate gland; this mass spread laterally and seemed to surround the apex of the bladder. There was no significant enlargement of lymph nodes and the spleen was not palpable. Excretory urography disclosed a moderate degree of hydronephrosis involving both kidneys (Fig. 5a). Albuminuria was graded 3, pyuria, 1 (on the basis that the least amount is grade 1 and the greatest amount, 4) and erythrocyturia, 1 (on the basis that the greatest amount is graded 5). Values for hemoglobin and the erythrocyte count of the blood were normal. The sedimentation rate was 101 mm. in one hour (Westergren). The value for urea was 42 mg. per 100 cc. of blood. Roentgenologic examination of the thorax, pelvis and spinal column disclosed nothing abnormal.

Cystoscopic examination performed by Dr. E. N. Cook disclosed chronic, diffuse cystitis, with considerable shaginess and mucosal hypertrophy over the trigone and base of the bladder. Biopsy of a section of tissue from

the region of the prostate gland demonstrated lymphosarcoma of the lymphocytic type.

Roentgen-ray treatment over a fifteen-day period was directed to the bladder and perineum. The patient returned home on July 23, 1951.



Fig. 5 (Case 4). (a) Excretory urogram on June 30, 1951, showing moderate degree of hydronephrosis involving both kidneys. (b) Excretory urogram four months later, showing essentially normal-appearing renal pelvises.

The patient returned for re-examination on October 31, 1951. At that time he had no complaints. The prostate gland seemed to be normal at rectal examination. Excretory urography revealed essentially normal-appearing kidneys (Fig. 5b). Cystoscopic examination demonstrated a minimal amount of prostatic fullness. No treatment was given.

Results of examination again were normal on February 1, 1952, but when the patient returned on June 6, 1952, an enlarged lymph node was found in the left posterior cervical triangle. There was also a mass in the midabdomen, considered probably to represent peri-aortic lymphadenopathy, and there was some degree of infiltration of the prostate gland. Roentgen-ray therapy was directed to these three areas.

In September, 1952, the patient noted a mass just above the navel, and he received roentgen-ray treatment to this area.

In December, 1952, perirectal infiltration associated with diarrhea was found, and again he received roentgen-ray treatment. In February, 1953, additional involvement of the rectum was discovered, with partial obstruction of the bowel. Because of the unfavorable response to roentgen-ray treatment, a course of nitrogen mustard was administered intravenously. The patient died at home in the spring of 1953.

Comment on Case 4.—In 1949 Waller and Shulenberg⁶ reviewed twenty-one cases of primary lymphosarcoma of the prostate gland reported in the literature, and added one new case. The age

of the patients reported ranged from twenty-two to sixty-eight years, and the average age was forty-one years. The authors wrote that lymphosarcoma of the prostate gland should be considered when a large tumor of that structure occurs which is not hard or nodular, and when the patient is middle-aged. Sarcoma of the prostate gland, on the other hand, is a disease of children.

Comment and Summary

Four cases of lymphosarcoma have been reported in which the initial manifestations presented themselves in extranodal sites. The occurrence of the process in such sites probably is more frequent than is true of Hodgkin's disease. The organs or structures primarily involved were: (1) an extra-ocular muscle, (2) the frontal bone of the head, (3) the left lung, and (4) the prostate gland. Difficulty in diagnosis arises when there is neither superficial lymphadenopathy nor definite evidence of enlargement of more deeply seated

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Treatment of Severe Injuries of the Hand

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THE great importance of the functional capacity of the hand to the skilled craftsman, the artist or musician, the physician and surgeon, is of course apparent to everyone. We must, however, not overlook the fact that a serious injury to the hand with resultant crippling may be equally disastrous to the laborer, the farmer, the housewife; indeed a handicap to anyone. The miraculous capacity of the human hand was the text of an article in a recent lay magazine entitled "Your Hands are Incredible." In this article, John Pfeiffer points out the following facts about the dexterity of our hands:

1. The pianist, Paderewski, playing at top speed, struck 120 notes a second, varying the rhythm and striking force with amazing control.

2. It is estimated that the five fingers in combination can assume any one of 300 million possible useful positions.

3. About one-third of the 5 million tiny cutaneous sense organs of the entire body are located in the hands.

4. During World War II, blind workers using touch alone actually did a surprisingly superior job of sorting precise machine parts for radar equipment than sighted workers using micrometer gauges.

5. It is, of course, the capacity for the human thumb to rotate into position of opposition that separates the homo sapiens from the higher apes.

The human hand has been described as an organ of grasp, an organ of sensation, and an organ of expression. All injuries of the hand, from the time they are first seen, should be treated with the purpose in mind of restoring this high degree of functional capacity. With this emphasis on early restoration of function, there are a few general principles that are worthy of mention.

General Considerations

1. Early closure and coverage of wounds. The scarring and fibrosis that accompanies delayed

healing and open wounds results in stiffness and loss of function in the hand.

2. Treat swelling from the first. This is particularly true in crushing types of injury where swelling may be severe. Prolonged swelling restricts interphalangeal motion and is accompanied by fibrotic changes in the capsules of the metacarpal-phalangeal and interphalangeal articulations. Treatment of swelling may include constant elevation, compressive type dressings, and stellate ganglion blocks.

3. Immobilize only the portion of the hand that is necessary and this should be immobilized in functional position (partial flexion of the metacarpal-phalangeal and interphalangeal joints).

4. Early mobilization of the hand. Active and passive motion should be started as soon as consistent with the healing of the injuries, often before complete bony healing is accomplished.

5. The main responsibility of the doctor first treating an injured hand is proper treatment of the wound. The importance of obtaining uninfected and rapid healing cannot be over-emphasized and should be the main objective of the emergency treatment.

Major injuries to the hand, as occasionally seen from punch presses and frequently seen with corn picker injuries on the farm, may involve loss of some of the component parts of the hands. Viable and possibly viable tissue in general should be preserved. This is particularly true with regard to the thumb and with sole remaining portions of fingers opposed to the thumb. It is important in dressing these injuries to maintain the thumb and first metacarpal in position of opposition so as to avoid contraction of the web and inability to oppose the thumb to the remaining hand. Care may include early skin grafting in order to prevent undue sacrifice of remaining skeletal parts. Rehabilitation may include use of prosthetic appliances or occasionally transposition of finger to replace the thumb.

Severe injuries to the hand may often combine damages to the skeletal and soft parts. Judicious use of primary amputation may be indicated where

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damage to the metacarpal-phalangeal or proximal interphalangeal joints makes return of function impossible, or where the traumatic amputation leaves an ineffective stump. This should be done only when some of the remaining digits are intact and at times may be preferable to long periods of disability and consequent economic loss.

In cases where there is combination of fractures in phalanges and metacarpals associated with tendon injuries, it is often best to obtain stabilization and healing of the bony components and passively mobile joints before attempting repair of the tendon injury. Repairing all components primarily may leave too long a period after repair before rehabilitation can be started, resulting in binding down of the tendons and diffuse stiffness of the hand. The use of fine Kirschner wires to immobilize fractures may allow resumption of motion before complete bony healing of the fracture is accomplished.

Tendon and Nerve Injuries

The difference in the results in repair of extensors tendons from that of repair of flexor tendons has long been apparent to all. Extensor tendons for the most part are single tendons and do not slide in sheaths. Their motion back and forth is possible because of the long fiber type of areolar tissue about them. Repair usually consists simply of approximation by suture, and splinting of the wrist and fingers so as to relax all tension on the anastomosis. Repair of flexor tendons on the other hand, is not only technically more difficult but also prone to give much poorer results. This is particularly true in the region of the hand extending from the distal palmar crease to the proximal interphalangeal joint. In this area primary repair of flexor tendons has an extremely poor prognosis. For this reason, Dr. Sterling Bunnell has labelled this area "no man's land." In a recent review of some 500 tendon injuries in the hand, Dr. M. F. Hauge¹ presented some interesting facts. The seriousness of flexor tendon injuries in "no man's land" is attested to by the results of ninety-eight primary tendon sutures in this area, in which Dr. Hauge also included the thumb. There was one successful suture (in the thumb) and three fairly satisfactory results (two in the thumb) and ninety-four failures. When we look to see what is unique about this area of the hand anatomically, we find, of course, that in this region both the flexor sublimis and flexor profundus tendons run together

through a very tight reinforced portion of the tendon sheaths. Tendons injured and repaired in this area tend to bind down during the process of healing, subsequently do not slide normally, and finally flexion is accomplished, usually limited to the metacarpal-phalangeal articulation. For this reason, it is becoming more and more generally believed that lacerations of the flexor tendons in this portion of the hand are best treated primarily by simple cleaning of the wound, closure of the wound, obtaining flexible joints by early passive motion, and then subsequent removal of the flexor sublimis tendon and replacing the flexor profundus tendon by free tendon graft.

A second serious special injury presenting difficulty of technical repair is the injury of the median nerve at the base of the thenar eminence. As the median nerve emerges in this area, it branches into sensory branches to one-half the ring finger, to the middle finger, the index finger, and the thumb, and sweeps back into the thenar eminence with motor branches to the opponens, short abductor and one head of the short flexor muscles. The anatomy is intricate when intact and, when altered by trauma, can be difficult for any of us.

As we have mentioned in the presence of extensive soft tissue and skeletal injuries it may be better to close these wounds, to get good healing and pliable joints, and to plan on secondarily accomplishing tendon or nerve repairs or grafts, rather than to attempt multiple primary tendon and nerve repairs.

Dr. Joseph H. Boyes, past president of the American Society of Hand Surgery, has stated that there are three components to the trade of any skilled craftsman: materials, principles, and techniques.

As craftsmen in the repair of the injured hands, the "material" with which one works is the anatomy of the hand: the bones, the joints, the muscles and tendons and their sheaths, the nerves and the blood vessels, and the skin. These are the lumber, the metals, and the paints with which we must be familiar to accomplish good work.

The principles involved in hand surgery are represented by the knowledge and judgment of what should be done with each of the various types of injuries which we see in order to assure return of function.

It is our technique in dealing with this material and applying these principles that to a great extent

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The Use of Liquid Oxygen in Dermatology

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LIQUID oxygen was used for the treatment of cutaneous diseases in Minneapolis by Irvine and Turnacliiff,¹ who reported their findings in 1929. For the next two decades little attention was paid to this modality in the Upper Midwest. We became interested in the use of liquid oxygen several years ago following discussions with Dr. Ashton L. Welsh of Cincinnati. Kile and Welsh (1948) reported their results in the treatment of more than 1,000 patients with disorders of the skin. They observed that liquid oxygen was an effective local destructive agent in patients having warts, hemangiomas, keratoses, or leukoplakia.

A. C. White (1899)² reported originally on the use of liquid oxygen by dermatologists. Following Pusey's³ paper concerning the dermatologic uses of solid carbon dioxide, liquid oxygen went into eclipse. It was due largely to the reports of Kile and Welsh (1948)⁴ and Allington (1950)⁵ that interest in the use of liquid gases as cryotherapeutic agents in dermatology has been stimulated. In a paper (in press) presented recently (April, 1955) before the American Dermatological Association, Dr. A. Fletcher Hall, of Santa Monica, California, voiced his enthusiasm concerning the use of gaseous refrigerating agents in the treatment of selected cutaneous disorders.

Allington stated that in recent years the commercial demand for oxygen and nitrogen has led to the production of these elements in almost pure form and in large quantities. The process of manufacture includes the compression and the refrigeration of atmospheric air and then its fractional distillation and chemical rectification. Liquid oxygen boils at -297°F. (-183°C.) at atmospheric pressure. The sublimation point of carbon dioxide is -110.3°F. (-78.5°C.) For a time, liquid oxygen was more easily obtained than liquid nitrogen. When the latter

became more commonly available, some workers preferred it because it had the advantage of being largely inert and presented less of a fire hazard than liquid oxygen. Since liquid oxygen is combustible, contact with fire should be avoided, but it is entirely safe to use if reasonable care is taken. Liquid nitrogen is 13°C. colder than liquid oxygen, hence evaporation is more rapid. Because liquid oxygen is delivered to our office daily from Monday through Friday, this is of little practical importance. The material can be transported from the manufacturer in an ordinary thermos bottle carried in a cardboard carton. The use of a Stanley all-steel vacuum bottle obviates breakage and the use of the cardboard container. Kile and Welsh stated that they obtained one liter of liquid oxygen weekly. In our experience this quantity of liquid oxygen evaporates within twenty-four to thirty-six hours, especially during the warm months of summer. For this reason we decided on a daily delivery so that the oxygen would be available when occasion demanded.

Liquid oxygen is applied by means of an ordinary cotton swab or cotton wrapped around a wooden applicator. The latter is dipped into the liquid and applied to the lesion to be treated. The amount of pressure varies according to the depth of the growth, but only slight to moderate pressure is required in most instances since freezing is almost instantaneous. Lesions such as verrucae on the palmar or plantar surfaces require several seconds to become frozen to their complete depth. The area which is being treated turns white rapidly because of the extreme coldness of the liquid oxygen. Pain varies according to the size and depth of the lesion. Shortly after the initial application of the fluid, after the area is blanched, there is little discomfort. As thawing occurs there is an increase in pain which may last for several hours. Mild analgesics are helpful. After lesions have been treated with liquid oxygen, redness and swelling develop within a short time. In a few hours a bulla forms, which

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reaches its height within two or three days. Sometimes the lesion is hemorrhagic, and patients should be warned that this is no cause for alarm. It has been our custom to instruct patients to

in two satisfactory improvement, in one no improvement, and three patients failed to return for observation.

We have not attempted to use liquid gases in



Fig. 1. Bullae one week following the application of liquid oxygen.

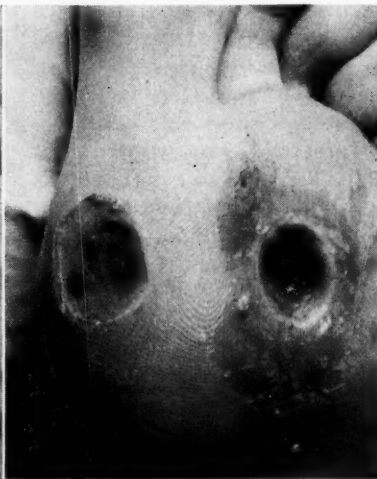


Fig. 2. Appearance of the skin immediately following the trimming of the bullae with small scissors.

return in one week, at which time the roof of the bulla is removed, and the lesion dressed. Healing takes place within two to four weeks, depending upon the size and thickness of the lesion. The development of scars is rare, but when they occur, they are soft, thin, and inconspicuous. Keloids occur rarely, if ever. Repeated treatments are necessary occasionally. We have used liquid oxygen mainly in the treatment of verrucae of various types. In our opinion it is the best way to treat plantar warts of the mosaic type.

Although we have employed liquid oxygen over a period of several years, we have surveyed our statistics only since 1953. Table I is self-explanatory.

In the past two years we have also treated thirty-four cases of hemangioma simplex. In twenty-five the result was considered to be satisfactory. Nine patients failed to return for observation.

It is our impression that liquid oxygen is of definite value in the topical treatment of chronic discoid lupus erythematosus.

We have used this agent in sixteen cases of keloid. In ten an excellent result was obtained,

TABLE I. VERRUCAE TREATED BY MEANS OF LIQUID OXYGEN

| | Satisfactory Results | Failures | Failed to Return | Total Cases |
|-------------------------|----------------------|----------|------------------|-------------|
| Verruca Vulgaris | 92 66% | 8 6% | 39 28% | 139 |
| Verruca Plana | 5 50% | 2 20% | 3 30% | 10 |
| Verruca Plantaris | 84 67% | 11 9% | 30 24% | 125 |
| (including mosaic type) | 181 65% | 21 8% | 72 27% | 274 |

the treatment of leukoplakia which was satisfactorily treated by Kile and Welsh with liquid oxygen and by Allington with liquid nitrogen. Furthermore, we have had no experience in the treatment of dermatitis venenata such as can be produced by various plants.

As aforementioned, our study has been devoted chiefly to verrucae. The latter are extremely capricious in their course, and the results of any treatment are almost unpredictable. Destructive measures such as electrocauterization and electrodesiccation are curative in many cases and x-rays are valuable in others. We believe that liquid oxygen is an excellent addition to our armamentarium for the treatment of warts and

(Continued on Page 158)

Problems in the Clinical Diagnosis and Classification of Ventricular Hypertrophy in Adults

III. Familial Cardiopathy

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THE THIRD and final paper in this series of three presentations concerned with problems in ventricular hypertrophy deals with three cases, all in one family, of the entity termed "familial cardiomegaly" by Evans.¹

Report of Cases

Case 1.—A twenty-three-year-old white woman was hospitalized in May, 1930, because of shortness of breath on exertion. One week prior to admission, she had attended a picnic, following which abdominal pain, nausea, vomiting, and slight fever had developed. Three days before admission, rather marked fatigability and dyspnea on exertion began.

The blood pressure was 86/70. The skin and mucous membranes appeared paler than normal but cyanosis was not present. A gallop rhythm was described, with a pulse rate of 110 beats per minute. A low-grade fever lasted for one week.

The hemoglobin was 76 per cent (Sahli). Erythrocytes numbered 4,340,000 and the leukocyte count varied from 10,150 on admission to 15,750 on the fourth day of hospitalization. The differential count was not remarkable.

Electrocardiograms showed sinus tachycardia (rate 105-90), slight slurring of the QRS complexes and changes in the T waves. On May 12, the T waves in leads II and III were negative and those in lead I were flattened. The PR interval was 0.18 second. Ten days after the first tracing, the T waves in all three standard leads were reported to be negative. (These data were available on microfilm but the electrocardiograms themselves had not been photographed). The PR interval was 0.20 second, with a heart rate of 102. The patient was dismissed in June as improved, but she was admitted again in July, 1930, because of abdominal pain, bloating and vomiting. She was dyspneic on examination, and the pulse was weak and fast (125). On July 18, cyanosis, hemoptysis and increasing dyspnea required digitalization and use of an oxygen tent. Death occurred on that date.

Necropsy was done by Dr. Kano Ikeda. The heart weighed 400 gm. Moderate hypertrophy of both right

and left ventricles was present, with great dilatation of all the chambers. The valves were normal. The circumferences of the valves were as follows: tricuspid, 14 cm.; mitral, 11 cm.; pulmonary, 7 cm.; aortic, 5 cm. The right auricular appendage contained a small mural thrombus and a larger one was present in the left ventricle. The mural endocardium was smooth, except for a small area of grayish thickening in the left ventricle. The coronary arteries were normal. The aortic arch was reduced in diameter, as were the great vessels arising from it.

Microscopic sections of the myocardium were normal, except for swelling and edema in a few areas. The mural endocardium showed slight fibrous thickening; one area in one section showed subendocardial infiltration of monocytes and lymphocytes.

The anatomic diagnoses included cardiac hypertrophy and dilatation, hypoplasia of the aorta and arterial trunks, thrombus of the right auricle and left ventricle, infarct of the right lung with embolism of the pulmonary artery, chronic passive congestion of the organs, pleural effusion, pericardial effusion, and ascites.

Case 2.—A 26-year-old physician, a younger brother of the patient just described, was hospitalized in February, 1936, and died in the hospital on April 8, 1936. Two weeks before admission, he had a severe cold, with a nocturnal cough. Dyspnea began gradually. On the night before admission severe substernal pain began, accompanied by blood-streaked sputum.

His past health had been excellent, except for three episodes of pneumonia in 1915, 1916 and 1920.

Temperature was 100.4°F., pulse rate was 136, and blood pressure was 90/70. Pallor was noted. There was some injection of the pharynx. Many moist râles were elicited at both lung bases, and there was evidence of fluid at the right base. The pulse was described as rapid, weak and of poor volume. The heart was generally enlarged to the right and left. The sounds were all of poor quality, and a pulse deficit of 30 beats per minute was noted. A short presystolic murmur at the apex was present, with some accentuation of the second sound at the apex; the pulmonic second sound was accentuated. The liver was slightly enlarged, but the spleen was not palpable. No edema of the extremities was present on admission.

The patient was placed on the usual "cardiac routine" and remained in bed for three weeks with some improvement. He was then allowed up but it was seen

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MARCH, 1956

FAMILIAL CARDIOPATHY—SOMMERS

at once that there was a return of orthopnea and dyspnea, and he was put back to bed. Digitalis appeared to help but little. His pulse rate was continually fast, and a gradual increase in the size of the liver was noted. On March 30, he suddenly became worse,

places, a definite chronic inflammatory process was present. In numerous locations beneath the endocardium and in some zones deeper in the wall of the left ventricle, there were groups of lymphocytes and polymorphonuclear leukocytes arranged in thin layers and

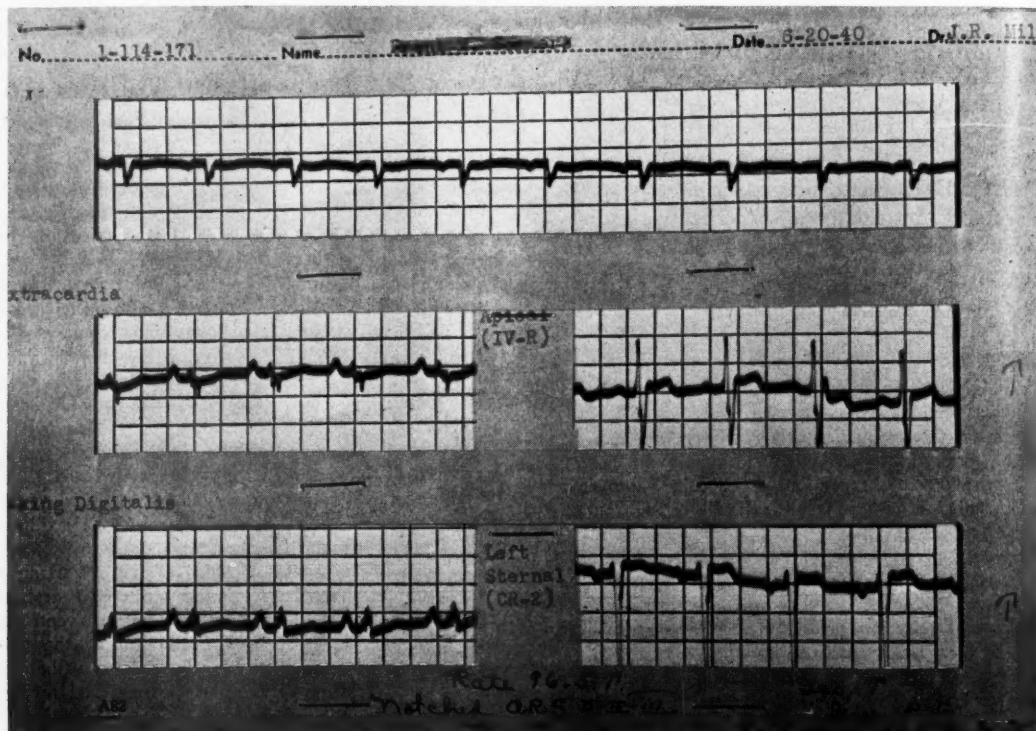


Fig. 1 (Case 3). Electrocardiogram in a twenty-five-year-old man with familial cardiopathy and situs inversus.

with increase in dyspnea and orthopnea, elevation of temperature, and beginning edema of the sacral region. He was placed in an oxygen tent but grew worse and died suddenly two months after onset of symptoms. Laboratory studies were noncontributory.

Necropsy was done by Drs. Wilson and Blackman. The heart weighed 520 gm. The form was rounded due to apparent increase in size of both the right and left ventricle. The epicardium was normal. All the valves were delicate in appearance and competent. The myocardium was everywhere free of scarring except for a small area beneath a large thrombus of the endocardium of the left ventricle. The coronary arteries were normal.

Microscopic sections were made from every possible portion of the heart and all of them showed essentially the same picture. There was widespread scarring throughout the myocardium without any particular distribution of the scars in relation to arteries. They ranged in size from minute scars involving small portions of muscle bundles to large scars involving several muscle bundles. The muscle fibers in such regions were replaced by pale, pink-staining, rather homogeneous fibrous tissue without inflammatory cells. In other

strands. Some of these had a perivascular distribution.

The anatomic diagnoses included diffuse progressive scarring of the myocardium (idiopathic progressive myocarditis), cardiac hypertrophy and dilatation, mural thrombi in right and left ventricles, chronic passive congestion of organs, infarcts in lungs, spleen and kidney, jaundice, anasarca and diphtheritic esophagitis.

Case 3.—A twenty-five-year-old man, a younger brother of the two patients just described, died of cardiac failure in August, 1940. This patient was hospitalized before death on two occasions, once in March and again in August, 1940. Shortness of breath began one week prior to the first admission and two weeks after onset of a cold with sore throat. Except for a chronic sinus infection, his past health always had been good. He had known since physical examinations for entrance to college that he had complete situs inversus.

The pharynx was reddened and the nasal mucous membrane was injected. Numerous moist râles were elicited over the bases of both lungs posteriorly. The heart was regular in rate and rhythm, and there were no murmurs. The apex beat was on the right side. The

blood pressure was 96/74. The liver border was palpable a half finger below the costal margin. Edema of the extremities was absent.

Results of laboratory studies were normal except for a leukocyte count of 17,000, gradually decreasing to 10,880.

A 6-foot film of the thorax showed a slightly enlarged heart, with a cardiothoracic ratio of 49.6 per cent, and complete situs inversus.

Gradual improvement occurred and the patient was sent home on a very restricted regimen. In July, 1940, he was taken to the Mayo Clinic, where Dr. Frederick A. Willius examined him. The electrocardiogram obtained there was loaned for reproduction (Fig. 1). No definite diagnosis was possible, except for dextrocardia and complete situs inversus. Dr. Max Hoffman, physician in charge of this patient, believed that the electrocardiographic changes and the clinical course were suggestive of myocarditis, similar to the condition in the older brother (Case 2).

The second admission to the hospital was necessitated by a great increase in nocturnal dyspnea. Definite cyanosis was seen on admission. Numerous moist rales were again heard, and slight edema was now present.

Results of laboratory studies were much the same, with moderate leukocytosis. The electrocardiogram was reported as showing a 3:1 auricular flutter.

Marked cyanosis and dyspnea required venesection and oxygen, and the patient seemed in imminent danger of death. Gradual improvement occurred, but sudden death took place three days after dismissal from the hospital.

Necropsy was done by Dr. Kano Ikeda. The heart with the pericardium open measured 17 cm. in transverse diameter. It occupied the right side of the thoracic cavity, its apex pointing to the right. There was complete transposition of the heart and great vessels. The heart, together with the ascending portion of the arch, weighed 560 gm. The epicardium was smooth. The myocardium was unremarkable in color or consistency. The left ventricle was 2 cm. in thickness and the right ventricle was 9 mm. A large thrombus was attached to the mural lining of the right and left ventricles near the apices, and one was present in the right auricular appendix. All the chambers were greatly dilated. The mitral orifice measured 12 cm. in circumference, the tricuspid, 14 cm., the pulmonary, 6 cm. and the aortic ring, 5 cm. The aortic arch was greatly reduced in size and considerably shortened. The coronary arteries were normal.

Microscopic sections of the myocardium were entirely normal, except for two fields. One of these showed only a few lymphocytes. The second small field showed a rather severe acute myocarditis involving both the interstitial tissue and also the muscle fibers. Dr. Otto Saphir kindly reviewed these sections and stated that if no other disease were found at necropsy that could possibly account for the myocarditis as a complication, he would believe that this was an instance of isolated myocarditis.

The anatomic diagnoses included dextrocardia and complete situs inversus, hypoplasia of the aorta, cardiac hypertrophy and dilatation, mural thrombosis of the left ventricle and of the right auricle and ventricle,

chronic passive congestion of the organs, embolism of the left lower trunk of the pulmonary artery, infarct of the left kidney, an anomalous artery at the lower pole of the left kidney and an azygos lobe of the left lung.

Comment

An older brother and a sister, fifty and forty years of age, respectively, at the time this is written, are living and well. The mother died suddenly of a cerebrovascular accident at the age of seventy. The father is eighty-four years of age. In December, 1954, he successfully underwent removal of a chondroma of the mediastinum; this arose from a rib and weighed 5 pounds. Family records reveal no other similar cardiac conditions.

These two brothers and the sister were of a similar body build, varying in weight from 120 (Case 1) to 150 (Case 3) pounds, and from 65 to 67 inches in height, respectively. All had taken active part in athletics during high-school and college days, and appeared to be in excellent health just prior to the onset of their fatal illnesses.

These three unusual cases present a problem in diagnosis and classification. The diagnosis of hypoplasia of the aorta made in Cases 1 and 3 now has been abandoned. Myocarditis was present in Cases 2 and 3 but was not demonstrated in Case 1. The possibility remains that more sections of the myocardium in the latter case might have shown areas of focal myocarditis. Unfortunately, none of the hearts is now available.

It is difficult to avoid the conclusion that some unknown familial myocardial disease was present in each case. The similar clinical course, attacking at a similar age (twenty-three, twenty-six and twenty-five years), lends support to this viewpoint. The presence of complete situs inversus in Case 3 and of a chondroma in the father suggests what Dr. Willius, in a letter to Dr. Hoffman, called "the vicious portrayal of the relentless forces of heredity."

Evans,¹ in a paper entitled "Familial Cardiomegaly," described three cases in one family, and possibly three more unproved ones, with cardiac hypertrophy. Bundle-branch block was present in two, and tachycardia was a frequent occurrence. At necropsy, marked myocardial fibrosis was present in all three. Evans believed his cases might have been related to Friedreich's

disease. The cardiac manifestations in Friedreich's ataxia are described in detail by Schilero and associates.² Myocardial fibrosis was the commonest finding, and infiltration with lymphocytes and eosinophils was also noted. Occasionally, pericardial effusion, complete heart block, bundle-branch block, valvular involvement as in rheumatic fever, and coronary sclerosis were present. The findings in Evans' three cases and in Cases 2 and 3 of this report are pathologically consistent with the cardiac manifestations in Friedreich's disease.

In the case records of the Massachusetts General Hospital,³ Case 28042 is that of a man who died at twenty-nine years of age with idiopathic cardiac hypertrophy. His sister and possibly one brother were thought to have the same condition. Complete heart block was present in this case and in the sister. The heart weighed 600 gm. and exhibited enormous dilatation of all the chambers. Aside from hypertrophy, the muscle fibers were normal on microscopic study. A mural thrombus was present in the left auricular appendage. This case resembles Cases 1 and 3 of the present report. Dr. Paul White's comment was pertinent to this discussion. He said, "Each year, at the time of our graduate courses, we try to present one such case as this. It is not only very humbling, but it is also stimulating to our own further studies."

Summary and Conclusions

Three cases of familial cardiopathy are reported. Complete situs inversus was present in one instance. Myocarditis was present in two of these cases but the myocardium in the first case appeared normal. It is postulated that the same familial disease was present in all three cases. Friedreich's disease without the neurologic involvement is a possibility.

Acknowledgments

This series of papers could not have been written without the help of a number of physicians. For permissions and various clinical and pathologic data, I am grateful to Drs. J. Meade, P. Soucheray, E. T. Hermann, J. W. Jesion, C. W. Waas, A. D. Pollack, and G. Mirick. Dr. Kano Ikeda restudied various cases with me and personally prepared all the photomicrographs. Drs. B. J. Clawson and G. E. Fahr gave me valuable advice in the preparation of the manuscript. Dr. O. Saphir restudied the sections in one case. I am deeply grateful to Dr. J. E. Edwards, without whose help this manuscript could not have been written.

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LARYNGOCELE

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Trichinosis, a Declining Infection

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A SURVEY was conducted from June 17, 1952, to November 7, 1954, at the Minneapolis Veterans Hospital to determine the incidence of infection with *Trichinella spiralis*. Portions of diaphragms from 100 autopsies were examined by the compression and digestion methods.

Except for the exclusion of five cases known to have died of tuberculosis, the cases examined for *Trichinella* were taken at random among the autopsies performed at the hospital, the choice of cases depending only on the authors' work schedule.

Riley and Scheifley¹ in Minneapolis conducted one of the first surveys of *Trichinella* incidence. Using the compression method they found twenty of 117 cases (17.1 per cent) infected. Scheifley² found fifteen of 118 cases (12.7 per cent) infected in the same city. Numerous surveys in the United States between 1931 and 1942 reveal an incidence of approximately 16 per cent.³ In San Francisco⁴ an incidence of 8 per cent was found in the same city and using the same methods as fifteen years before⁵ when 24 per cent were found infected. No statistically significant difference in the composition of the two samples could be shown.

Materials and Methods

Samples of muscular diaphragm were removed by the pathologist. Approximately 90 per cent of the specimens examined weighed between 70 and 80 grams. One sample weighed only 50 grams and the heaviest weighed 165 grams.

One gram of each sample was used for compression examination. Thin portions of teased muscle were compressed between two glass plates and examined for *Trichinella spiralis* larvae under a dissecting microscope or the low power of a compound microscope. The glass plates were held in

place between two rectangular brass frames 3½ by 5 cm., and compression was applied by means of two thumb screws. The remainder of the specimen was ground up in a standard household meat chopper. The ground muscle was digested with freshly prepared artificial gastric juice in a 37° C. water bath for a minimum of twenty-four hours with occasional shaking. The artificial gastric juice consisted of 1 per cent pepsin and .25N HCL solution. The suspension was then strained through gauze into a separatory funnel and allowed to stand for a minimum of two hours. Ten ml. of sediment were diluted with distilled water, transferred to a petri dish and examined for *Trichinella spiralis* larvae. Microscopic examinations were done with a stereoscopic dissecting microscope with a magnification of 54 or with a binocular compound microscope using a magnification of 50.

Infected rat muscle was processed on two occasions to verify the effectiveness of the technique.

Results

Of the 100 subjects studied, there was one female and ninety-nine males, one negro and ninety-nine white. Eighty-nine were native-born Americans; the eleven foreign-born came from Austria (one), Canada (one), Finland (two), Germany (two), Norway (two), Russia (one), Scotland (one), and Sweden (one). There was one Jew, nineteen Catholics, and eighty Protestants. Seventy-six were residents of Minnesota, thirteen came from adjoining states, and one from Florida. Eight were farmers, while ninety-two were non-farm workers or retired.

The age distribution was as follows:

| | |
|-------------------|----|
| 20-29 | 8 |
| 30-39 | 6 |
| 40-49 | 5 |
| 50-59 | 36 |
| 60-69 | 38 |
| 70 and over | 7 |

The two positive cases were males in the 60-69 age group, were nonfarm workers and white, na-

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tive born residents of Minnesota. One was Catholic and one Protestant.

Discussion

While the earlier surveys in Minneapolis gave no information on the composition of their samples relative to age, race, religion, et cetera, we conclude that there has been a real decrease in incidence in this area. The difference between the present results and those of Riley and Scheifley¹ is more than five times the standard error, and between present results and those of Scheifley² is more than four times the standard error.

Such a marked decrease in the incidence of trichinosis is likely to be attributed to the recently enacted laws (Chap. 355, Minn. Laws 1953, and other laws in neighboring states in the same year) which require the cooking of garbage fed to hogs. It should be pointed out that the present survey was already half completed on July 1, 1953, when the Minnesota law went into effect, and continued for sixteen months thereafter. *Trichinella* cysts

remain alive, or at least visible, for so long in man (variously recorded as thirteen, twenty-four, and thirty-one years by Gould) that the influence of a factor reducing the incidence of the parasite would become evident only after some years. Beard⁵ finds that there has been a marked decrease in *Trichinella* infection in San Francisco in recent years. We believe that there was a marked reduction in *Trichinella* infection in Minnesota before the garbage cooking law went into effect.

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LYMPHOSARCOMA

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nodes.⁷ As is true of all the lymphomas, the diagnosis of lymphosarcoma is dependent on biopsy of the involved tissue.

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USE OF LIQUID OXYGEN IN DERMATOLOGY

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is especially valuable in cases which have been treated unsatisfactorily with other measures.

Summary

Liquid oxygen has been a useful agent in the treatment of warts, even though the results are not perfect. In our opinion it is the preferred treatment of the so-called mosaic wart. In our experience it has been also helpful in the treatment of hemangioma simplex and small keloids.

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Accidental Gunshot Wounds

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PENETRATING wounds produced by high velocity missiles have increased in numbers since the end of World War II. The use of arms by many people during combat has projected itself into more widespread interest in hunting, skeet and similar sports. Large numbers of guns of various sorts were returned as trophies from battlefronts throughout the world. The improper care and handling of these weapons has increased the number of accidental gunshot wounds. In consequence, the physician in areas some distance away from large medical centers, and simultaneously within those areas frequented by the greatest number of hunters, finds himself more and more often called upon to treat the patient with gunshot wounds.

Types of Gunshot Wounds

Many attempts at classification of gunshot wounds have been made. No classification is entirely satisfactory. The type of missile which inflicted the wound is however of some importance to the physician.

The high caliber, relatively large missile tends to project itself in a relatively straight course. It is unimpeded by most bony structures and will produce rather extensive local trauma adjacent to its path. Frequently, it will produce a through-and-through wound. Such a wound is productive of relatively massive hemorrhage because of the large local area which is traumatized. Many patients inflicted with this type of missile survive only a few moments.

The relatively low velocity, smaller missile has the characteristic of penetrating the initial few inches of the integuments of the human body with ease and then to be rather easily deflected by cartilaginous and bony structures and to course along the path of least resistance. Such a missile may wander over great distances, taking a circuitous route, to imbed itself in either soft tissue or bone with relatively little force. This type of missile produces very little local trauma because of its size and velocity. However, because of its erratic course it frequently endangers many structures pro-

ducing relatively widespread damage in comparison to its size.

The small, relatively high velocity pellet produces only minimal damage at the site of its penetration. Damage is relatively great because of the multiplicity of wounds rather than to the individual destruction produced by any one pellet.

Location of the Gunshot Wound

The location of the point of entrance of the missile is of great importance in the management of the patient with a penetrating gunshot wound. Gunshot wounds of the *head* produced by high velocity, relatively large, missiles are almost immediately fatal. In rare instances, the missile may avoid vital centers and the patient may be relatively asymptomatic except for the point of entrance and exit. Low velocity missiles of relatively small caliber frequently enter the calvarium and do not penetrate the opposite side. The missile lies within the substance of the brain. Since the bullet is of relatively low velocity, the local damage is not great. Such patients may have a minimum of neurological signs. When death is not instantaneous, hemorrhage within the brain is the primary problem because of damage to vital centers.

Gunshot wounds of the *face* produce widespread destruction and massive hemorrhage. If death is not instantaneous, the maintenance of an adequate airway become the primary problem. Destruction of the tongue, portions of the pharynx, larynx and trachea may not produce instantaneous death. However, death by asphyxiation within a few minutes may occur because of the massive hemorrhage and obstruction of the airway. Gunshot wounds of the *neck* should be treated as soft tissue injuries unless major vessels or the cervical spine are involved. In this type of injury, maintenance of an adequate airway is imperative in the immediate treatment of the patient.

Gunshot wounds of the *thorax* are of two primary types. When there is injury only of the lung parenchyma, hemorrhage and transient atelectasis

are encountered. These, however, are usually self limited and there is adequate time to undertake correction of the hemopneumothorax. When, however, a major vessel has been entered, hemorrhage is massive and death is relatively rapid.

Gunshot wounds of the *abdomen* present the greatest single problem for treatment. In the absence of massive hemorrhage most patients with this type of injury will survive until immediate medical care is available. The multiplicity of organs within the peritoneal cavity makes the definitive treatment extremely difficult. Mortality rate in abdominal gunshot wounds is relatively high. The circuitous course of the missile within the peritoneal cavity makes thorough search of each organ imperative.

Treatment

The general consideration and treatment of gunshot wounds differs in no respect from similar wounds produced by other means. The treatment of shock is, of course, imperative. The maintenance of an adequate airway is always imperative. The use of wide spectrum antibiotics is indicated. Specific treatment may be briefly outlined as follows:

Gunshot Wounds of the Head.—Shock in this type of injury may be of neurogenic origin. The anatomical location of the entrance of the missile may indicate immediate severance of the middle meningeal artery and demand its urgent ligation. In general, supportive therapy is indicated with operative intervention only when there is progression of the coma or neurological findings to indicate increased intracranial pressure.

Gunshot Wounds of the Face.—Maintenance of an adequate airway is imperative. Immediate tracheotomy is often urgently indicated. Control of hemorrhage is important because of the vascularity of the area involved. Careful débridement and primary closure of facial wounds may be left for forty-eight hours while the patient stabilizes. Repair of fractures of the facial bones should be carried out within one week in order to produce the best cosmetic results. Primary reduction of multiple fractures should not be carried out unless the patient's condition has improved remarkably from the initial insult.

Gunshot Wounds of the Neck.—Maintenance of an airway is again imperative. Tracheotomy is

often mandatory. Control of hemorrhage is imperative if a major vessel is involved.

Gunshot Wounds of the Thorax.—Primary attention should be centered on adequate respiratory exchange. The presence of a massive pneumothorax should be immediately detected and aspirated. Catheter thoracotomy may be indicated if continued hemorrhage occurs within the pleural space and if the initially reduced tension pneumothorax recurs. It is imperative that the hemothorax be adequately removed in order to prevent a constrictive pleuritis necessitating decortication at a later date.

Gunshot Wounds of the Abdomen.—Exploratory laparotomy is always indicated. In occasional instances, one may feel that the missile has penetrated only through the layers of the anterior abdominal wall in an oblique direction and has not entered the peritoneal cavity. Such patients should be explored. Failure to recognize perforation of an intraperitoneal viscus may lead to the patient's death. Incisions should be large so that the entire peritoneal cavity may be inspected. Perforations of the hollow viscera of the peritoneal cavity are usually in equal numbers since a point of entrance also requires a point of exit. The operator should not satisfy himself that all damaged organs have been adequately repaired until he has followed the gastrointestinal tract from the diaphragm down to the rectosigmoid. The liver, spleen and pancreas should be carefully inspected. The retroperitoneal duodenum must not be overlooked in the exploration. The renal and ureteral areas should be carefully inspected for signs of damage. In most instances, the missile should not be sought after and removed if it is lying in an unaccessible position and in such a position as not to jeopardize the patient's life.

Gunshot Wounds of the Extremities.—In the absence of vascular or neurological findings, gunshot wounds of the extremities represent penetrating wounds of the muscle which require only expectant treatment. Débridement of the point of entrance and exit is carried out to prevent early closure of the wound and to establish adequate drainage. Irrigation of the wound tract is contraindicated. Arterial injuries of the extremities are manifest by massive hemorrhage. Primary repair

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Sick People in a Troubled World

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IMPROVEMENT in the health of the people of the developed parts of the world since 1900 constitutes one of the great achievements of the past half-century. Although some nations of the world still have pressing problems of communicable disease and life expectancy rates vary from nation to nation, the trend in all nations is toward a greatly increasing life expectancy—with the result that throughout the world we are producing an aging population. Medicine's number one problem in the developed areas of the world is no longer the acute, communicable diseases which claimed their victims with dramatic swiftness, but the slow insidious processes of the chronic diseases and the disabilities which they leave in their wake.

Lacking specific measures in the cure of many of the chronic diseases medicine must look to rehabilitation to teach those afflicted by disability to live and to work as effectively as possible. Until medicine finds the specific answers to the problems of the diseases of the heart and circulation, rheumatic fever and arthritis, cerebral palsy, multiple sclerosis, poliomyelitis, and the other crippling diseases, we must utilize the techniques of physical rehabilitation, psychology, social service, vocational counselling, and the para-medical specialties to teach the disabled to live within the limits of their disabilities, but to the full extent of their capacities.

We, as physicians, have a particular stake and a particular responsibility for this problem, for it is one that we have created—created with insulin, liver extract, vitamins, new surgical techniques, sulfonamides, antibiotics, cortisone, and everything else that has gone into making medical care what it is today.

Two thousand years ago, the average length of

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CONTRIBUTIONS OF PURE SCIENCE TO PROGRESSIVE MEDICINE

In other words, the great majority of patients seriously ill can be rehabilitated before operation or aided in weathering the storms of readjustment following operation.

Physicochemistry of the human body concerns life itself. A proper understanding of these vital processes is necessary to every man who practices medicine, no matter what his specialty may be; and as for the surgeon, the newer knowledge is changing his outlook. By calling to his aid the scientist, the internist and the various specialists, he is able to bring relief to a large number of patients who formerly were looked on as beyond help, or who, unprepared for operation, were subjected to a high risk. Rehabilitation is to be a master word in medicine.—WM. MAYO, M.D., *The Journal of the American Medical Association*, 84: no. 20 (May 16) 1925.

life was twenty-five years; at the turn of the century, it was forty-nine; recently compiled statistics of the National Office of Vital Statistics show the average length of life in the United States has now increased to sixty-eight. Today, there are more than 28,000,000 Americans who suffer from chronic disease and physical disability. Staggering as this is, we can expect it to increase in the future; for as our population becomes older, the incidence of chronic disease and its resultant physical disability will increase correspondingly.

Until recent years, the great majority of the medical profession looked upon rehabilitation as an extracurricular activity of medicine, something dealing with social work and vocational training, but something which had little concern, which held but few implications, for medicine. Today, however, that trend is being reversed, and although there are still many physicians who are unfamiliar with the aims and procedures of rehabilitation, more and more, medicine is beginning to recognize that medical care cannot be considered complete until the patient with a residual physical disability has been trained "to live and work with what he has left."

The recent tremendous surge of public and professional interest in rehabilitation has not been

limited to the United States. Great Britain and the Northern European nations, faced as we are in this nation with a striking increase in chronic disability resulting from the extension of the life span, have long recognized the medical, social and economic values of rehabilitation.

This interest now, however, is being seen in Latin America, the Near East, Southern Europe, and Asia, in those parts of the world commonly termed "underdeveloped." In some of these nations, rehabilitation services are provided by voluntary groups which are national affiliates of the International Society for the Welfare of Cripples. In others, the national or local governments have built the facilities and operate the programs.

This spring, a new Rehabilitation Institute for the Blind was opened in Mexico City. An important part in its planning was played by an American specialist from the Office of Vocational Rehabilitation, which has been in Mexico the past three years under the Institute of Inter-American Affairs, helping the Mexican government organize services for the handicapped.

The International Society for the Welfare of Cripples' affiliate in Lebanon is developing a rehabilitation program for children in Beirut which will be affiliated with the Pediatrics Department of American University. The World Health Organization is providing personnel and the United Nations International Children's Fund equipment for the new center.

In Korea, the Republic of Korea, the United Nations Korean Reconstruction Agency and the American-Korean Foundation teamed together two years ago to open a 300-bed National Rehabilitation Center at Tongnae, just outside of Pusan.

These developments over the world did not just happen. Behind them, particularly in the so-called "underdeveloped areas" of the world there is beginning to emerge a new concept of the dignity of man and the value of the worth of the individual that is being symbolized and expressed in the development of rehabilitation services for the handicapped.

Just as our own favorable geographical, political, economic, cultural and social circumstances have placed the United States in a position of world leadership and responsibility in so many other fields of endeavor, we bear a special responsibility globally in the development of rehabilitation services to the handicapped. But in accept-

ing this responsibility, we are serving more than high idealistic, moral and humanitarian ends.

Peace is never a product of military force alone. Nearly ten years of the cold war have taught us that political health of our own nation and of the world depends on the physical and mental health of our people.

Today through the World Health Organization, the United Nations, our own Foreign Operations Administration and various international voluntary organizations, we have tangible and specific methods through health for building strong allies and true friends.

Experience has long shown that rehabilitation services for the disabled is a purchasable commodity. Today the world now has the technical knowledge and skills to bring improved rehabilitation services to the disabled no matter where they live. Results can be anticipated almost in direct ratio to the efforts and funds expended.

Aside from the political and economic significance of improving the health of the people of the world, rehabilitation can also provide the understanding between peoples and nations that is the essential foundation of any political effort toward peace. This has been brought forcibly home to me during the past few years when I have had increased opportunities for personal travel and have seen directly the results which can be achieved in international understanding through rehabilitation and services to the handicapped.

Last September at The Hague, for example, at the Sixth World Congress of the International Society for the Welfare of Cripples, there were 800 delegates from thirty nations. Physicians, nurses, government officials, employers, therapists and interested citizens, they had one common interest—how services for the disabled in their own nations and globally could be improved and extended.

They came mostly at their own expense because of their desire to learn and to share their experiences and knowledge with others.

Two unmistakable facts emerged from the meeting. The first—and very encouraging—is that rehabilitation services for the disabled are increasing rapidly throughout the world. The second—and equally discouraging—is that the number of persons needing such services is increasing more rapidly.

A part of the increasing incidence of physical disability found in the developed parts of the world

results from the lengthening of the life span through medical advances, better public health and improved living standards.

Persons who a few decades ago would have died from acute communicable diseases now live and in their later years acquire such crippling afflictions as arthritis, multiple sclerosis and Parkinson's disease, or they suffer strokes.

Similarly each year, medical advances are made that prevent death but leave survivors with severe disabilities. Each represents a precious human life saved, but it raises the question of whether the society that can save a life can also, through rehabilitation, give that life dignity, purpose and meaning.

Never before in human history have our opportunities for reaching this objective of lives of dignity, purpose and meaning for the disabled been as great. Today, we can approach with confidence many disabling conditions which, even as recently as twenty years ago, were generally accepted as hopeless. But the greatest of these assets is not the skill of the surgeon, the wonders of antibiotics, or modern techniques of selective placement—our greatest assets are these patients themselves.

When I was in Poland in 1949, I went through a concentration camp in Auswich, the largest one there. In a room half the size of this large center section, the first thing one saw was a bin filled with braces and crutches and canes and prosthetic devices, because the cripples were the first who went to the gas chamber. Hitler forgot that that was the spirit of Germany. The Communists forgot in 1950, and most of us forgot that it happened.

The year before the Communists marched down into South Korea, they drove across the thirty-eighth parallel a million people—the old, the halt, the sick, the lame, and the blind—feeling that if they put this load on the staggering economy, it would cause it to fail. It had just the opposite effect. It gave the South Koreans strength that they didn't know it was possible to have. Refugees were taken in, the food was shared, the warmth was shared, the clothing was shared. And it became a part of the great spiritual strength that has allowed this little country to lose more people than we lost in World War I, World War II and the Korean War put together, times two, and still ask for the privilege of continuing to fight to be free.

In our planning for the future of such persons, we have too frequently operated under the fallacious concept of generations ago that success and ability to do a given job was dependent upon physical strength. This, however, has not been true since the days of the cave men, and most of us today use less than 25 per cent of our physical capacities in daily living. The great single asset in our work, however, is still the patient and the tremendous powers of recuperation and compensation which the patient possesses.

The blind man, for example, has lost his sight, but he has compensated for that loss by overdeveloping his senses of touch and hearing, for this is the way he now sees. He carries the white cane and taps it because his ears are so acutely attuned that he can tell whether the echo coming back is from a wall or from an area of trees or if he is in an open space. Put the blind man to work in a photographic darkroom or in his own environment and he will turn out 30 per cent more work than the man with sight who is working by his side.

Society today pays for only two things: what we have in our heads and the skill in our hands. But compared with the average, so-called "normal" person, the person with a severe physical disability often has another asset in far greater supply than we have—that is their depth of spirit.

Of the various phases of international health endeavors there is none today in which the efforts of all—both governmental and voluntary—have been more closely integrated than in rehabilitation. It is not surprising that we have and are achieving this high degree of co-operation in our work for the handicapped where, in many instances, those concerned with other forms of human relationships have failed.

I have tried to state these reasons in a short statement which I prepared some time ago for Edward R. Murrow's program, "This I Believe." I would like to close by reading this statement for it is my own philosophy about "Sick People in a Troubled World."

"I can't remember when I didn't want to be a doctor. Even as an adolescent when I scrubbed floors and ran errands at the local hospital in order to smell ether and go on rounds with the country doctor, surgery did not spell the glamour in medicine to me. It was people—sick people—their suffering, their problems and their victories that challenged.

"It has been a rare privilege to be a doctor in medicine's golden era. Far more scientific advances have been made in the last three decades than in all time heretofore. Man's life span has increased from eighteen two thousand years ago to sixty-eight in America today.

"But I have found it impossible to ignore the fact that these great medical advances have posed new problems. Crippled children who in the past would have died early in life now survive. They want to grow and work and love and be loved.

"I have heard old people to whom we have added these years ask, 'For what—the shelf to wait for death, or an opportunity to live and work in dignity as long as we are able?'

"Millions of veterans throughout the world who have scarred their minds and given parts of their bodies to war have more than earned their right to live and love and work and to know that their sacrifice has at least been one small stone that is being used to build a better world.

"Sick people throughout the world ask their God, 'Why must I suffer?' Possibly the answer comes in the work of the potter. Great ceramics are not made by putting clay in the sun; they come only from the white heat of the kiln. In the firing process, some pieces are broken, but those that survive the heat are transformed from clay into objects of art, and so it is, it seems to me, with sick, suffering and crippled people. Those

who, through medical skill, opportunity, work and courage, survive their illness or overcome their handicap and take their places back in the world have a depth of spirit that you and I can hardly measure. They haven't wasted their pain.

"Because of this experience, they have a desire to share that is almost a compulsion. It matters not whether they be a physician from India, a Zionist from Israel, a Greek veteran or a Pole disabled in a mining accident—all want to share the understanding they have gained through suffering or by helping those who have suffered.

"I believe that this basic and inherent desire of man to do something for his less fortunate fellow transcends religious dogmas, political beliefs and geographical barriers. If we could only use this universal language, we would have a tool to unravel the babel of tongues and an instrument which would penetrate any iron curtain or closed boundary.

"It does not seem strange to me that the sick should turn to those who have suffered for their greatest comfort. And so, in a sick world, it is not strange that we turn to those who have been ravaged by suffering and disease for a common language. If we could start to work here together in a program where all of us have the same goals, it is more than possible that, with God's help, we would find the solution for living together in peace. This I Believe!"

TREATMENT OF SEVERE INJURIES OF THE HAND

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will insure the successful outcome of treatment of hand injuries. Bunnell has said that one cannot fix a watch in the bottom of a bottle of ink. Similarly, we are handicapping ourselves in operating on the small structures of the hand if our field of vision is occluded by blood. Major hand surgery should be accomplished on a dry operating field maintained by pneumatic tourniquet. Then again, we cannot do fine work with large instruments designed for abdominal or large extremity work. Large instruments may cause increased trauma to tissue and clumsiness in repair. We must not jeopardize our work by not having the right equipment and the right operating conditions.

Boyes suggested that we give 10 points to each

element—the material, the principle and the technique—and that our "batting average" would then be equal to the product, not the sum, of our rating in each of these sections. It can be seen then that we can drop only a few points in each component before our average will fall off precipitously. If we are going to do the best that we can to prevent serious crippling in the severely injured hands that come to our care, we must not be confused about the anatomy, must not make poor decisions as to what needs to be done, and must not handicap ourselves with inadequate instruments or poor working conditions.

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Medicine in Southern Minnesota

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IT is a prerogative of the president of the Southern Minnesota Medical Association to deliver an address on a subject of his own choosing. I prefer to confine my remarks to matters close at hand. This, then, will be somewhat of a "State of the Union" address on medicine in southern Minnesota.

I think it is obvious to all of us that the state of the union is good. Good medicine is practiced in southern Minnesota. Good medical practice is moving to the small communities, and our section of the country has made progress, in this respect, that far surpasses the tremendous general progress in medicine during the past decade. I invite any disbelievers to make rounds with us in our small community hospitals.

There are many intricately interwoven reasons to explain our gratifying progress. I will mention a few, simply that we may pause for a while to count our blessings.

An influx of well-trained young men, both specialists and much-needed general practitioners, has certainly been a healthy stimulus in recent years. The middle-aged and older physicians that I know have accepted this challenge of young competitors by utilizing any special knowledge of their young colleagues advantageously, while still competing forcefully in the only way that really counts; namely, by giving their patients *good* medical care. This, too, has created a healthy situation, for wisdom gained by experience and refreshed by a continuous search for knowledge is hard to beat.

Without wishing to slight my other fellow specialists, I would like to point out that the present availability of x-ray specialists has been a particularly valuable addition to our small communities. It is hard to conceive of practicing medicine without a roentgenologist handy, isn't it! And yet only a few years ago you could hardly find one anywhere. Incidentally, I secretly envy these fellows: They do not have to compete with anyone,

Presidential address delivered at the annual meeting of the Southern Minnesota Medical Association, Albert Lea, September 12, 1955.

except the occasional patient with poor and sphincter control. They can live in the midst of the crowd and keep with perfect sweetness the independence of solitude.

It seems almost superfluous to mention the favorable influence of our two large, nearby medical centers upon medical practice in our area, and yet we must never forget our geographically favorable position. Where else can an ordinary country surgeon pick up a telephone and, for a few cents and on a first-name basis, get the gracious assistance of any number of the world's best consultants? I never feel belittled by asking for such help when I need it. On the other hand, I have no intention of being overwhelmed by the competition or misled into the debilitating practice of dumping all my tough problems in someone else's lap.

We are also grateful for the advantages in post-graduate education which are offered by the proximity of our medical centers and by the continued efforts of the directors of these centers to make their teaching facilities available to us. We should make the most of our opportunities.

One cannot fail to recognize the fact that a favorable economy and the rapidly increasing coverage of our population with voluntary health insurance plans have been big factors in the improved medical care which we are now enjoying. Health is no longer much neglected for financial reasons.

It is regrettable that a few patients, hospital administrators and physicians have abused insurance coverage, at least in principle, even though they may be within the limits set forth in the fine print. This practice is not widespread—I would say that 99 per cent of us lean over backwards to be fair and honest to both the patient and the insurance carrier. It is hard to delineate a clear line of cleavage between the many essential x-rays and other diagnostic studies that are demanded by medical science and the modern charlantry of diagnosis by exhaustive tests. Certainly the problem patient deserves "the works," but when every patient be-

comes a problem patient, one's colleagues begin to wonder. I suspect that a mixture, in unknown proportions, of a subconscious appreciation of one's own ignorance, avarice and just plain laziness motivates the offenders. I also suspect that these offenders do not appreciate the fact that they are easily spotted by their colleagues, nor do they seem to realize that they are a cancerous growth that could kill the health-insured goose that lays such nice golden eggs. The fact that seemingly intelligent patients continue to return to them and that they occasionally unearth a surprise diagnosis would seem to be poor compensation for the practice of bad medicine disguised by good x-ray and laboratory tests.

Now that I have slipped over into a somewhat critical attitude, I should like to continue along this line for a brief time. Before doing so, I would like to reiterate that the practice of medicine in southern Minnesota is good—very good. Under such circumstances one can be sharply critical without fear of offending too many people. It's a good time, though, to evaluate our own faults, while they are few in number and easily eradicated.

There has been a great deal—in fact, too much—said and written about the evils of unnecessary surgery and fee-splitting in recent years. The problem is almost non-existent with us, I am sure, but let us continue to be frankly and openly disapproving of any offenders. Let us be honest with ourselves in evaluating our own surgery; it's the

hardest thing in the world to do, I know, for a general surgeon to decide what *not* to do. The problem must be even more difficult for the general practitioner doing some general surgery. I know there are many general practitioners who do quite acceptable major surgery, and I personally see no reason for specialty groups to attempt to arbitrarily limit them; the honest practitioner will limit himself. The greatest of faults, though, is to be conscious of none, and this creates the greatest of surgical problems, or perhaps I should say, the greatest "problem surgeons": how does one limit the man who is doing surgery he has no business doing? I know of no good answer, unless it be that we so continuously expose such men to the disease of intellectual honesty that they eventually catch it.

One final thought. The doctor is constantly being drafted, often too willingly, for civic activities of all types. I know that we physicians have been criticized for failure to uphold our civic duties and that we have definite obligations to our communities, churches, service clubs and many worthy causes; but I would like to interject a small word of caution: this thing can be overdone. Somewhere along the line, if one has too many civic commitments to fulfill with promptness and efficiency, patients are sure to be neglected.

"The physician lives not for himself but for others. This is the essence of his profession. Do not look for fame or profit. Work to save others though you lose yourself. Maintain life, restore the sick and ease the suffering of man. You have no other object."

ESOPHAGEAL HIATUS HERNIA

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included a right pneumothorax in one patient, and the thromboembolic episodes in two.

One patient died of a myocardial infarction two months postoperatively. Though his preoperative electrocardiogram was negative, one wonders in retrospect whether his coronary disease rather than his hernia was responsible for his pain. The remainder of the patients are living and well, and there has been no evidence of recurrence of any of the hernias. One patient, an intensely conscientious executive, has had a return of some vague gastrointestinal symptoms, but a recheck x-ray examination is negative. The rest of the patients are asymptomatic.

In conclusion, we feel that many people with

vague upper abdominal complaints should be studied with hiatal hernia in mind; if the defect is present, well-planned treatment will usually relieve the patient of his symptoms.

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Case Presentations

Henoch-Schoenlein's Purpura

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HENOCH-SCHOENLEIN'S purpura is a generalized disease consisting of a characteristic skin lesion and found associated with joint symptoms, gastrointestinal colic and bleeding, with swelling of the face, extremities, and scrotum. The skin lesion, progressing from urticaria to typical purpura, is the prime feature of the disease. It may be associated with any or all of the other symptoms.

In 1837, Schoenlein¹ recognized the combination of rash with joint symptoms as related and named it "peliosis rheumatica." In 1874 Henoch² described the disease in four children and noted the association with hematuria. Osler³ was especially interested in these cases and felt that the symptoms were manifestations of an anaphylactic phenomena. He wrote: "The anaphylactic key will unlock the mystery of these cases." In 1948 Gairdner⁴ showed that both infection and hypersensitivity were involved. Lewis⁵ has compared this disease with nephritis and rheumatic fever and concluded that they may have a similar etiology.

The following case report is of interest because it illustrates the characteristic features of the disease.

Report of a Case

A boy, eight years of age, was admitted to the hospital because of fever and a sore throat of three days' duration. He had had two previous episodes of severe sore throat, during one of which it was feared that a tracheostomy would have to be done. However, he had recovered fully from both attacks. He had had uncomplicated measles and chicken pox. His past health had otherwise been good. His growth and development were normal. He was an only child of healthy parents.

Physical examination revealed a severe follicular tonsillitis surrounded by an inflamed, edematous area covered by a whitish, purulent, exudate. He had tender and enlarged cervical lymph glands and complained of

severe pain with swallowing. His temperature was 102° F. Examination was otherwise normal.

Laboratory examination revealed a normal urinalysis; the hemoglobin was 12.8 gm., and the leukocyte count was 11,950 per cu. mm.; B hemolytic streptococcus was cultured from the throat.

He was given an adequate dosage of oxytetracycline and saline irrigations of the throat. The following day he was much improved. His temperature was normal and he was able to eat and drink without pain. On the third hospital day he developed painful swelling of his knees, wrists, elbows, and ankles. His temperature rose to 100° F. and his Sedimentation Rate was 33 mm. (Westergren). An electrocardiogram showed an increased P-R interval. A diagnosis of rheumatic fever was made and a course of salicylates was started using aspirin in adequate dosage. On the fifth hospital day the boy showed no improvement and it was decided to discontinue aspirin in favor of cortisone. While on cortisone, the boy showed some improvement with less pain and swelling of the involved joints. On the ninth hospital day he suddenly developed marked edema of the face, extremities, penis, and scrotum. Cortisone was discontinued with the thought that edema was due to sodium retention. During the next two days the edema of the extremities disappeared, but continued in the face, scrotum, and penis. On the eleventh hospital day a fine purpuric rash appeared over his ankles, knees, arms, and buttocks. He began complaining of severe abdominal and chest pain. Upon examination his abdomen was rigid, very tender to palpation, and simulated an acute peritonitis. Laboratory findings included gross hematuria, Grade III albuminuria, sedimentation rate of 40 mm. per hour, normal platelet counts, normal blood urea nitrogen, and a normal bleeding and clotting time. The Rumpell-Leeds test was positive showing 15 to 20 petechiae per square inch on the left arm. These findings occurred concurrently with the appearance of purpura.

The boy then gradually improved. On his fourteenth hospital day the urine revealed microscopically Grade I hematuria and the albuminuria had disappeared. The areas of purpura were fading and the edema of the face and genitalia was almost gone. It was decided to send him home for further treatment consisting only of bed rest and a low salt diet.

During the following two weeks at home, he developed several transient areas of purpura on his trunk and extremities and also had intermittent severe abdominal

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and chest pain which required codeine for relief. During the third week at home, the boy developed persistent bloody stools and was readmitted to the hospital. Examination at this time revealed no purpura, swelling, or joint pain. Laboratory investigation revealed a normal urinalysis, hemoglobin of 12.4 gm., 4.85 million erythrocytes per cu. mm. and a sedimentation rate of 26 mm. per hour (Westergren). During the next two hospital days the bloody stools subsided and he was again discharged.

During the next month bed rest was continued at home and he had no recurrence of his symptoms. His sedimentation rate gradually fell to normal. He was gradually returning to full activity over a three-month period and has not had an exacerbation to this date, six months after his original episode.

Comment

This patient exhibited all of the features of Henoch-Schoenlein's purpura. Infection of the throat with B hemolytic streptococci was followed by the typical complex of: purpura, arthritis, swelling of the extremities, abdominal pain with bloody stools, and hematuria. These symptoms were intermittent for a period of one month.

The etiology of Henoch-Schoenlein's purpura is unknown. However, it may belong to the group of diseases which represent a state of hypersensitivity and are known as the "collagen diseases." The hypersensitivity may be either bacterial, following B hemolytic streptococcus infection, or non-bacterial, following exposure to specific protein antigens. Sir William Osler³ first made note of this and it has since been called "anaphylactoid purpura." Occasionally it occurs concurrently with rheumatic fever.⁴ The hematuria that occurs is indistinguishable from that of acute nephritis⁵ and is associated with albuminuria, cylinduria, and rarely a hypertension.

The purpura is the differentiating factor, without which the diagnosis cannot be made. Gairdner⁴ has described in detail the pathogenesis of these lesions and has shown a progression from simple urticaria through a maculopapular eruption to typical purpuric lesions. The purpura may be associated with one or all of the previously mentioned findings. The platelets are normal in number and the bleeding and clotting time are usually normal. The Rumpell-Leeds test may also be positive.

Henoch-Schoenlein's purpura is primarily a disease of children; it has its highest incidence at three years of age. It occurs more commonly in males than in females. The duration of the initial phase may be from three weeks to six months. Relapses of the purpura are common.

The abdominal pain, which often initiates the onset of the disease, may be very severe and simulate an acute abdominal emergency. It is for this reason many of these cases have exploratory laparotomies performed before the true nature of the disease is ascertained.

In this case the acute nephritis was of short duration, lasting only a few days. Some, however, are not so fortunate and develop into a chronic or latent nephritis. Wedgewood⁷ describes ten children of a series of twenty-six that had abnormal urinary findings several months after the initial attack. This appears to be more common in the child over six years and also those who have had several relapses of the disease.

Treatment of our case was confined to bed rest. Recently some authorities⁸ have used cortisone and adrenocorticotrophic hormone during the acute phase of the disease. They feel that the course of the disease is not significantly shortened and it does not prevent the urinary complications.

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Continuation Studies

Infectious and Postinfectious Encephalitis

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THIS paper deals only with the infectious, post-infectious and post-vaccination encephalitides which occur with reasonable frequency in the Minnesota area. It is our opinion that with the increased use of the poliomyelitis vaccine these various encephalitides will become of increasing importance as a diagnostic consideration in patients manifesting symptoms of encephalitis.

Primary Encephalitis

The primary encephalitides are presumably due to direct invasion of the central nervous system by viruses pathologically producing neuronal destruction in the brain and spinal cord and commonly a syndrome of fever, headache, stiff neck and pleocytosis. With the advent of modern tissue culture techniques for the diagnosis of poliomyelitis, an attempt has been made at Elizabeth Kenny Institute to make an etiological diagnosis of all patients referred to the Institute as non-paralytic poliomyelitis with the above symptom complex. Poliomyelitis virus isolation and antibody studies were carried out by Dr. Jerome T. Syverton of the Bacteriology Department, University of Minnesota, and antibody studies for other viral encephalitides by the Communicable Disease Laboratory of the Minnesota Department of Health under the direction of Dr. Henry Bauer. Diseases are listed in the frequency in which they were encountered at Elizabeth Kenny Institute during 1954 and 1955.

Poliomyelitis.—This disease is due to three antigenically distinct viruses, each one capable of producing the same clinical symptomatology. The

disease is apparently disseminated from person to person. The most commonly quoted incubation period is approximately fourteen days, but the virus is known to remain in the stools up to three or four months after onset. Poliomyelitis follows a biphasic course, especially in children, the first phase of which is nonspecific. The secondary phase affects the central nervous system with fever generally lasting five days. Scattered lower motor neuron palsies, which occur during the course of the febrile illness and when present in the absence of sensory changes, are diagnostic.

Nonparalytic poliomyelitis, in our experience, has been clinically indistinguishable from most of the other viral encephalitides. Prognosis with poliomyelitis is, of course, highly variable, but with nonparalytic poliomyelitis is excellent.

Mumps Meningoencephalitis.—Mumps virus has been isolated from the central nervous system on numerous occasions. Mumps meningoencephalitis is a very common disease reported to occur is up to 30 per cent of cases of parotitis. The symptoms of encephalitis generally follow those of parotitis but can precede or occur in the absence of visceral involvement. The disease usually runs a benign course with minimal disturbance of sensorium or evidence of neuronal involvement. A rare, yet characteristic, complication is involvement of the VIII cranial nerve producing vomiting, vertigo and deafness. This disease is one of the most benign of the viral encephalitides.

Lymphocytic Choriomeningitis.—Lymphocytic choriomeningitis, due to a virus found in lower animals and generally transmitted to man from the infected excreta of mice, is more common in the winter months but cases have been reported in Minnesota in every month of the year. The incubation period in the experimental infection in man is from twenty-four to seventy-two hours. The disease produces a very diverse clinical pic-

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ture. Fever often is bi- or triphasic; respiratory symptoms in the pre-central nervous system stage of the disease are the unique feature. Fever in most cases lasts five days and while the course is often benign, coma, paralysis and post-encephalitic Parkinsonism have been reported. Complications of this type notwithstanding, the prognosis is in most cases good.

Encephalitis of Undetermined Etiology.—At least 10 per cent of the patients referred to Kenny Institute with fever, headache and pleocytosis have been undiagnosable by existing techniques and apparently represent infections due to as yet undiscovered infectious agents.

Laboratory Diagnosis.—Table I shows the typ-

TABLE I. TYPICAL FINDINGS IN LABORATORY DIAGNOSIS OF VIRAL ENCEPHALITIDES

| Disease | Cerebrospinal Fluid | | | Diagnostic Tests |
|---------------------------------|----------------------------|-----------------|-----------------------------------|---|
| Poliomyelitis | Cells Mean 56 0-1000 | Sugar Normal | Protein 46 mg.% 20-150 mg.% | Neut. antibody rise within 2 wks. *Virus isolation from feces |
| Mumps | Mean 400 9-1700 | Normal | Normal | C-F antibody rise in 10 days |
| Lymphocytic Choriomeningitis | Mean 700 0-6000 | Occas. Low | Gen. Elev. 15-300 mg.% | *C-F antibody rise in 15-30 days Neut. antibody rise in 60-180 days Virus isolation from CS fluid |
| Coxsackie | Mean 20 6-200 | Normal | Normal | Virus isolation from feces |
| Equine Encephalitis | Mean 200 50-1000 | Normal | Sli. Elev. 20-70 mg.% | Neut. antibody rise in 14-30 days *C-F antibody rise in 14-30 days |

*Best diagnostic technique

Coxsackie.—There is a reasonable amount of evidence to incriminate the B group of Coxsackie virus with encephalitis. These viruses have been isolated along with polio viruses in many known cases of poliomyelitis at Elizabeth Kenny Institute. The most frequently described clinical picture is herpangina and myalgia associated with symptoms of meningeal irritation and fever. There have been no sequelae and no fatalities among our cases.

Western Equine and St. Louis Encephalitis.—The mosquito is known to be the vector, but the true reservoirs of infection are not definitely known. The incubation period is highly variable, being from five to twenty-one days. Arthropod-borne encephalitides, like so many other members of this group, cannot be differentiated clinically but the clinical features of the disease vary greatly with the age of the patient. The disease is far more severe in infants under one year of age than in older children and adults. Convulsions and drowsiness are common in infants. This disease can be transmitted to the fetus from an infected mother. The most common sequelae are convulsions, behavioral disturbances and upper motor neuron signs. Sequelae have been reported to occur in up to 50 per cent of children under one year of age to a low of 20 per cent in children between the ages of five and fourteen.

ical spinal fluid findings in the viral encephalitides and also lists the diagnostic tests which have been found to be useful in making a definitive laboratory diagnosis. Most of these diseases have spinal fluid cell counts which fall between the range of 50 and 250 and therefore provide little help in the actual diagnosis. Lymphocytic Choriomeningitis, however, often has a very high cell count of a mononuclear type which is highly suggestive of this diagnosis. The differentiation of lymphocytic choriomeningitis from tuberculous and other bacterial meningitides is occasionally complicated by the fact that spinal fluid sugars are sometimes abnormally low in this disease.

Secondary Forms of Encephalitis

These forms of encephalitis follow especially the xanthematous virus diseases and vaccination against smallpox. Their exact etiology is unknown, the prevailing theories being (1) direct invasion of the central nervous system by viruses, (2) activation of a second virus already present in the central nervous system, (3) damage to the central nervous system by toxic products of the viral infections, and (4) an antigen antibody reaction.

Post-Viral Encephalitides

The post-viral encephalitides are usually more severe than the primary viral encephalitides. Di-

rect destruction of neurons is unusual, but extensive myelin destruction adjacent to blood vessels is the most common pathological manifestation.

Measles Encephalitis.—The incidence of measles encephalitis varies with the epidemic, the usual case rate being one case of encephalitis to 1,000 cases of measles. Measles, when modified by gamma globulin, or when prevented, is rarely followed by encephalitis. The acute phase of the disease lasts approximately a week with stupor, convulsions and upper motor neuron signs being commonly reported as the early symptoms. These symptoms usually appear within five days after the appearance of the skin eruption but have been reported as appearing during the prodrome and as long as ten days after the skin eruption. Children manifesting extremely severe symptomatology in the acute phase of this disease often recover to a remarkable extent. Shaw reports in an article in the *Journal of Pediatrics* that one-third succumb, one-third recover with severe sequelae and one-third are normal and have minimal sequelae.

Varicella Encephalitis.—Chickenpox encephalitis generally follows skin eruption by three to eight days; its occurrence seems unrelated to the severity of varicella. The disease is much less common than measles encephalitis although the early symptomatology is quite similar. Ataxia and cerebellar symptomatology have been noted in a larger percentage of cases than in any other form of encephalitis. Age seems to bear no relationship to prognosis in this form of encephalitis. Convulsions are an ominous prognostic sign. The prognosis is somewhat better than measles, both acutely and in terms of sequelae.

Smallpox-Vaccination Encephalitis.—The highest reported incidence in all age groups is 1:5000. The disease is extremely rare in infants under one year of age. Some series quote a rate as low as 1:800,000. Symptoms generally appear ten to fourteen days after the vaccination with the disease following a hyperacute course; hyperthermia, coma and respiratory and cardiovascular complications are quite common. The mortality rate from post-smallpox vaccination encephalomyelitis is high—between 35 and 60 per cent.

Post-Bacterial Encephalitides

The pathogenesis of these diseases is very poorly understood. The actual pathological manifesta-

tions differ from the post-viral encephalitides in that there is often extensive endarteritis, perivascular bleeding and neuronal destruction. As a group they represent one of the more severe forms of encephalitis.

Post-Pertussis Encephalitis.—While the pathogenesis of post-pertussis encephalitis is not understood, it is observed often to begin after a paroxysm of coughing. This variety is much more common in the very young and produces severe motor and medullary disturbances, as well as mental retardation. According to Livingston in *The Diagnosis and Treatment of Convulsive Disorders in Children*, this disease is the most common cause of post-encephalitic convulsive disorders despite the wide use of pertussis vaccination.

Post-Pertussis Vaccination Encephalitis.—The symptoms of this variety of encephalitis occur from one hour to one-and-a-half days after the injection of pertussis vaccine. Livingston, in his monograph on convulsive disorders in children, which covers a study of approximately 7,000 children with recurrent convulsions, seriously questions whether children with convulsive disorders or convulsive tendencies are any more likely to develop cerebral complications from pertussis immunizations than are other children. The onset of post-pertussis vaccination encephalitis is explosive with the most common symptoms being fever, convulsions and motor disturbances. Prognosis is not good for those cases manifesting motor symptoms and recurrent convulsions which may gradually clear up over a period of many months, or persist indefinitely.

Scarlet Fever and Rheumatic Fever.—Encephalitis, excluding Sydenham's chorea, accompanies rheumatic fever more commonly than scarlet fever in which it occurs in two cases in 10,000. It is characterized by many more behavioral disturbances than the other forms of encephalitis; acute delirious mania and extreme psychomotor activity, accompanied by choreiform movements and incoordination, are the common symptom complex. The mortality rate is reported to be 15 per cent, 40 per cent having permanent sequelae especially in the form of behavioral disturbances.

Treatment

The treatment of the diseases described above is almost entirely prophylactic and symptomatic. The

important factor in the treatment is to anticipate involvement of the vital structures by heeding such warnings as facial palsies which generally precede involvement of medullary respiratory and cardiovascular centers and shoulder musculature involvement which often precedes paralysis of muscles of respiration. Conflicting reports have appeared concerning the therapeutic value of ACTH and cortisone in the post-infectious encephalitides. These agents are contraindicated in the primary viral encephalitides with the possible exception of mumps.

Sedatives should be used only with great care, especially respiratory depressants such as morphine and barbiturates.

Respiratory Management.—Respiratory insufficiency secondary to airway obstruction and respiratory infections is the most common cause of death in these diseases.

Airway obstruction can be prevented through the use of postural drainage and frequent suctioning. In rare instances, tracheotomy may be necessary. The value of intubation in emergency cannot be overemphasized.

Infection can be prevented through frequent turning, pounding of the chest, humidity, expectorants and prophylactic antibiotics.

Respiratory paralysis requires use of the respirator. If none is available, "bag breathe" with an anesthesia machine. If respiratory paralysis is due to involvement of the respiratory center with sparing of the muscles of respiration, curare can be used to relax the patient in the respirator.

Vascular Insufficiency.—Rule out the possibility of respiratory induced shock and heart failure. Cardiovascular centers are rarely involved. Nor-epinephrine should be used cautiously to avoid gangrene at intravenous site.

Feedings and Fluids.—Intravenous feedings are desirable initially to avoid possibility of aspiration. Effort should be made to avoid over-hydration with possible aggravation of cerebral edema. Great care should be exercised in administering gastric feedings containing too high a solute load to comatose patients because of the danger of producing dehydration, hyperchloremia and azotemia. Gastric hemorrhage and perforation are relatively common complications and can be prevented by the instillation of cream and antacids.

Prevention of Deformities.—Extremities should be put through a full range of motion several times daily to prevent deformities. We have also found hot packs to be useful in relieving pain and muscle spasm.

Hyperthermia.—Hyperthermia is the common cause of death in patients with encephalitis, apparently due to involvement of the hypothalamus. When aspirin fails to lower temperature, it is highly suggestive of disturbance of the temperature-regulating mechanism and is a signal for the most vigorous efforts to lower temperature, especially by lowering the environmental temperature.

Conclusions

This paper presents a brief review of the more common forms of encephalitis which are seen in infants and children in this region. A résumé of the treatment of these diseases is also presented.

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HYPOTENSIVE DRUGS

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The number of drugs used in the treatment of essential hypertension has multiplied rapidly in the past three years. Despite use of many names, the four basic agents are (1) *Rauwolfia serpentina*, (2) *Veratrum viride*, (3) hydralazine hydrochloride and (4) the ganglion-blocking agents, hexamethonium and pentapyrrolidinium bitartrate. Contrary to the usual advertisement, treatment of essential hypertension is often difficult. However, many patients with essential hypertension can be treated successfully by use of one or more of these basic agents.

All these drugs have effects other than hypotensive. These effects may be minimal to severe and transient to persistent; every physician who treats essential hypertension should be familiar with them, as should the patient. The effectiveness of any hypotensive drug cannot be predicted. Thus, a trial of treatment is important. If one drug fails, another agent or a combination of drugs should be tried.

Rauwolfia serpentina is usually safe and easy to administer. Troublesome side effects are infrequent; they include nasal stuffiness, sedation, mild bradycardia, laxation and, at times, nightmares and agitated depression. The hypotensive effect of *Rauwolfia* may not appear for several days or weeks, as it is not a potent hypotensor. It is most effective in mild, labile hypertension and less so in severe hypertension. It characteristically induces a feeling of tranquility and well-being, without somnolence. Reduction in blood pressure is gradually induced and smoothly maintained. The drug is usually administered four times a day; after six to eight weeks, one or two tablets a day may suffice. Severe depression may occur with long-continued use.

From the Section of Medicine, Mayo Clinic and Mayo Foundation.

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Veratrum acts rapidly. The hypotensive effect begins about one-half hour after a single oral dose, reaching a peak in about two hours and diminishing over the next five to eight hours. Initially, a small dose is given after each meal and at bedtime. Each dose is gradually increased until satisfactory reduction of blood pressure is achieved or undesirable side effects occur. These effects are epigastric burning and hypotensive crisis, with increased salivation, hiccup, vomiting, bradycardia and circulatory collapse; they can be abolished by intravenous injection of atropine sulfate (1/120 to 1/60 grain). Results from preparations of *Veratrum* are unpredictable. Many patients cannot tolerate them in therapeutic doses; tolerance to their effect may develop. The range between their hypotensive and undesirable effects may be extremely narrow.

Hydralazine hydrochloride (apresoline) is a slow-acting hypotensor. It rarely reduces blood pressure to normal but, more commonly, to values approaching normal. It is usually used in combination with one of the other drugs. Initially, 25 mg. is given orally four times daily, with gradual increments of 25 mg. until 200 mg. is given four times daily or until reactions occur. The blood pressure of some patients is satisfactorily reduced with smaller doses. Some persons can tolerate the side reactions of apresoline. In others, reactions may be controlled by use of acetylsalicylic acid, tripeleminamine hydrochloride (pyribenzamine) or phenobarbital with each dose. Side effects from apresoline are common. The immediate ones are headache, tachycardia, dyspnea, paresthesia, nervousness, dry mouth and depression. Some reactions disappear with continued administration of the drug or reduction of dose. Later side effects (weeks to months) are chills and fever, swelling of the legs, arthritis similar to rheumatoid arthritis and a syndrome simulating acute lupus erythematosus.

(Continued on Page 188)

Laboratory Aids

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George G. Stilwell, Editor

IS IMMUNITY TO TRICHINOSIS BEING NATURALLY ACQUIRED?

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In spite of the fact that trichinosis has been recognized for centuries, its practical control and the ability to diagnose the disease and to treat it successfully remain about as unsolved as they were a century or more ago. Both hogs and man continue to acquire the disease and no specific or nonspecific treatment appears to affect its course. The protean nature of the symptomatology of trichinosis and the ease with which it may be confused with numerous other conditions are well known. No less confusing is the problem of diagnosis from the clinical or laboratory standpoint.

Diagnosis

Numerous immunologic tests done at various stages of the infection apparently have contributed little toward early confirmation of a clinical diagnosis. In addition to the laborious techniques involved in preparing satisfactory materials for immunologic procedures, there are the ever-present questions of interpretation of results. Little question exists that opinions differ on such interpretations or that results of such procedures frequently are misleading. Even the classic eosinophilia so often referred to in the literature as a cardinal diagnostic feature may be lacking or may be a manifestation of other parasitic infections or of nonparasitic disease.

The possibility of direct microscopic demonstration of *Trichinella spiralis* by means of biopsy examination of muscle from the person suspected to have trichinosis has much to offer in the confirmation of a clinical diagnosis. Furthermore, a combination of examination of pressed tissue and digestion of this tissue performed on suspect meat

eaten by the patient may provide the earliest and most valuable information available to the clinician. These procedures can be done quickly and require little laboratory equipment.

Examination of pressed tissue is done best by use of heavy glass plates mounted in metal frames that can be squeezed together by means of clamps or a bolting device so that the muscle being examined between the plates is pressed out to reveal its fiber structure clearly under observation at a magnification of 100 times. Many such devices have been described and illustrated in standard laboratory texts.

The material for biopsy should be taken from the pectoralis major muscle at the anterior fold of the axilla. This muscle is selected because it is the most readily available one having the greatest chance of being invaded. The diaphragm and the muscles of the thorax are involved most frequently. Such material should be examined in its entirety and the results must not be regarded as negative without careful scrutiny of all portions. If large pieces of muscle are available, digestion should be carried out after direct microscopic study of the material to reveal any organisms that may have been missed because of their position in the muscle. The sediment in the centrifuged digestion tube then can be examined microscopically for the typically motile larvae of *T. spiralis*. The materials for preparation of the digestive fluid and the apparatus used in this procedure are delineated in the technical appendices of most laboratory manuals.

While it is true that in 1956, as in former years, little other than supportive treatment is available for the person who has trichinosis, early diagnosis is important. There is always the possibility of reducing the degree of infection by purgation of such patients, provided one is equipped to examine material brought to the laboratory. The life cycle of the parasite of trichinosis is such that a

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This is the thirty-sixth in a series of editorial reports sponsored by the Minnesota Society of Clinical Pathologists and designed to foster closer relationships between clinicians and pathologists.

period of several days occurs during which intensive purgation can be of value in dislodging worms that ultimately would produce thousands of migrating larvae. The invasion of the tissues by such larvae produces the symptoms of the later stages of the disease. If these larvae are present in sufficient numbers, the infestation can be fatal. Unfortunately, it is true that most of the adult organisms in the intestine have disappeared when larvae are present in the muscles, but adult forms often persist in experimental animals for a long period and continue to give birth to larvae. This probably also is true in human disease.

Immunologic Aspects

It is all too apparent, however, that the message of public-health officials and others has not been taken from the lecture room to the dining room. While it is true that the mortality rate in this country is less now than that recorded in former times, evidence from various samplings of our population demonstrates an incidence of infection of 10 to 20 per cent. Moreover, occasional outbreaks of the disease still appear in which several persons die and numerous others are critically ill. Almost without exception these instances are referable to ignorance of or disregard for the basic facts concerning the proper handling of pork and pork products. A few moments spent occasionally by the family physician to explain to his patients the reason why Moses formulated his code of sanitation possibly might accomplish more than does the shotgun type of attack waged by the public-health official.

Needless to say, the persistence of infection with *T. spiralis* in both humans and hogs after years of effort to reduce it below the current incidence is cause for concern. However, one must not lose sight of the fact that most figures given for incidence are referable to zoologic infections, the figures being derived from post-mortem examination of persons who apparently had no history of clinical trichinosis. Moreover, extensive literature exists on experimental immunity to lethal doses of the larvae induced in animals by means of light zoologic infections. There is only slight reason to doubt that this same protective process is present in the human population, because little else can account for the relatively large incidence of in-

fections revealed by post-mortem examination as compared to the small number of cases diagnosed clinically as trichinosis. Thus, the suggestion has been made that there is actual benefit in the persistence of the infections still found in man and hogs.

The actual proof of reinfection of man by a second exposure to *Trichinella* larvae subsequent to a light zoologic infection has not been demonstrated. Nothing has been reported in the literature to prove that man does not acquire the same type of protective immunity found in experimentally infected animals. Indeed, there is much evidence that he does. The development of serologic immune reactions in man after infection strongly points to such a result. The lack of clear evidence at necropsy of the existence of both early and late infections in the same person, when so many zoologic infections have been observed, strongly suggests the development of an absolute immunity.

Keeping in mind the possible role of acquired immunity to lethal doses of *Trichinella* in the general public, one must recall the question raised thirty years ago with reference to the careful evaluation of the more recent proposal to irradiate pork for human consumption. Such a process doubtlessly renders pork free of infective *Trichinella*, at least in the sense that encysted larvae exposed to such irradiation are sterilized and incapable of reproduction. However, evidence exists that ingestion of such irradiated larvae does not produce immunity to subsequent doses of small numbers of larvae. Animals fed irradiated larvae have been found to be as susceptible as control animals when they are fed challenging doses of normal, nonirradiated larvae.

These experiments suggest that use of such irradiation might result in gradual loss of the protective aspects of the present incidence of zoologic infections. This, together with the sobering fact that there is still no specific treatment for the disease, could result in an increase in clinical trichinosis in both man and hogs, with consequent morbidity and mortality rates comparable to those in earlier records.

When one tampers with natural processes, he may sow a wind and reap a whirlwind.

Editorials

JOHN F. BRIGGS, M.D.
ARTHUR H. WELLS, M.D.
HENRY G. MOEHRING, M.D.

WHAT ABOUT READING?

In any professional field one of the greatest challenges faced by the worker is keeping abreast of current developments. Medicine, as one of the swiftest moving of the modern professions, presents an almost overwhelming problem in this regard. Yet many doctors handicap themselves unnecessarily in this struggle to keep up with the swiftly flowing currents of their profession. This handicap results from their failure to exploit the potential which they certainly possess for more effective reading.

No doctor needs to be reminded of the constant flow of reading material across his desk. Correspondence, reports, research papers, newsletters, and professional journals constantly accumulate in his basket and his briefcase. That which *must* be read somehow gets read; much that *should* be read does not.

No figures are available on the amount of time spent by medical doctors in reading each day, but it probably corresponds pretty well with the figures derived from studies of the business and industrial executive group. These studies show that the typical executive spends from two to four hours of each work day in doing his necessary reading.

In addition to this mass of work-type reading, consider the amount of general material which could also contribute to personal and professional development. *Publisher's Weekly* reports that in 1955 alone our presses ground out 12,000 different titles. *Ayer's Directory* lists about 2,000 daily and 10,000 weekly newspapers as well as 1,600 weekly and 4,200 monthly magazines.

No sane person would suggest that anyone could (or should) read any great proportion of this bulk. However, it is obviously desirable to do more of it than current studies show is being done.

Naturally, the physician reads more and reads better than a cross-section of the general population. But this is as it should be. Background, experience, and intelligence all tend to favor the professional man as a reader. The disconcerting fact is that this superiority is not nearly as great as it should be. Even given attributes which tend to provide an ideal climate for effective reading,

he surpasses the typical adult by only a minor degree in the rate and comprehension of reading.

Recent experience and research have demonstrated time and again that average readers can become superior readers and that superior readers can further extend the margin of their superiority.

Such gains may be achieved through the use of a great variety of aids currently available. The biggest drawback to this individual approach is that it often lacks the regularity and discipline. Colleges and universities offer courses of training in needed to effect the desired changes. Many college reading efficiency at the extension level. Most have consistently achieved desirable results in the needed directions.

The accelerating rate of advance in the field of medicine will no doubt make it mandatory for more and more doctors to take advantage of this type of assistance.

EUGENE S. WRIGHT
*Department of Rhetoric
University of Minnesota*

SYPHILOLOGY

Recent years have seen medicine develop into sometimes broad and sometimes narrow fields of specialization. As each new specialty establishes its certifying board, the event is heralded by both warmth and coolness. Medical progress is hailed on one hand and the trend to "super-specialize" decried on the other. Events of recent years may be foretelling the possible disappearance of a once busy specialty—that of syphilology. Three journals once devoted a major portion of their pages to this field. Two (*The Journal of Venereal Disease Information* and *The Journal of Syphilis, Gonorrhea and Venereal Disease*) of these have been discontinued and one (*The Archives of Dermatology and Syphilology*) has abandoned the latter half of its title. The Academy of Dermatology and Syphilology was renamed in December, 1954. In June, 1955, the section of the AMA devoted to diseases of the skin and syphilis likewise was reconstituted since, according to a resolution passed by the House of Delegates . . . "the

MINNESOTA MEDICINE

incidence of syphilis is decreasing and the need for specialized care by dermatologists in the treatment of patients with syphilis is decreasing."

These events are noteworthy and demonstrate the effectiveness of the various public health measures instituted to control venereal diseases. Penicillin has also contributed in a large measure to these changes. Despite these changes, syphilis has by no means been entirely eliminated. The number of persons under treatment for syphilis in the United States in 1954 was 1,921,000, and of these, 86,500 were new cases. Of the new cases, 7,688 were infectious and 7,234 were congenital. Furthermore, in forty-three of the forty-eight states, there has been a steadily increasing incidence of new cases in recent years. Although we have the advantage of more stable peacetime population groups and an effective therapeutic agent, other factors counter-effect these. Large numbers of our youths are still in uniform; interstate and intercontinental travel steadily increases. All of these call for more vigorous employment of time-proven public health measures. Unfortunately, in 1953 there was a sharp curtailment in federal funds for these activities. This has placed the responsibility for these measures in the hands of the state, the community and the individual physician.

The physician, as always, is either the strongest or the weakest link in the chain. Before the advent of penicillin, the hazards of arsenical therapy and the prolonged treatment schedules forced many patients into either public health clinics or a syphilologist's office. In these situations, the case-finding and case-holding efforts were managed by organizations and individuals devoted to these functions. Penicillin, conspicuously with less risk and administered easily over a shorter period of time, is correctly administered by the family physician in his office. Unfortunately, with the conclusion of the injection schedule, the patient is dismissed. This despite the known failure rate of 10 per cent in early syphilis treated with penicillin. Furthermore, little effort is expended in determining the initial source of infection. Contact investigation is not employed. Cases of known treated infections are not reported to the public health authorities of our communities. Case finding and case holding remain the more important responsibilities of the individual physician who assumes the responsibility of treating syphilis.

ROBERT F. TILLEY, M.D.

DOES THE PHYSICIAN NEED AN ARCHITECT?

Yes, no matter what building project interests the doctor, he needs professional planning service that only the architect can provide. In the construction of large hospitals, there is always an architect responsible for the design and construction. This is not always so, for many projects such as small clinics and residential work.

Why is this so? Perhaps an understanding of what the architect does will help. For instance, many people think the architect obtains work by bidding. To the contrary, he is engaged by direct selection or comparative selection by the client on a standard fee basis. Then contractors bid on drawings produced by the architect. By definition an architect is a master builder who professionally plans buildings and supervises their construction. To the durability, adequacy and convenience of a building, he adds that intangible ingredient—good design.

So, then, the physician and the architect are specialists in their respective fields. The contractor-builder is a very necessary part of the team—but not as a designer. Analogous to the nursing profession—certainly a member of the team, but not as a diagnostician or surgeon. The architect like the physician is prohibited from advertising by a code of ethics. The architectural graduate, too, requires his "internship" working in an architect's office several years before being permitted to take his registration examination. And like the medical profession, the architect also has his professional society, the American Institute of Architects.

Any physician would be hesitant to recommend a mid-wife when an obstetrician is readily available. Just as every patient is an individual case, so every building project is a special solution, and today the values of good architecture designed by architects are all around us.

Today, the architect is pioneering in a profession dedicated to better living. He has come to a clear conclusion: for an architectural form to have really lasting appeal it should—above all—make the fullest and best natural use of its materials. His work in designing airports, terminals, hospitals, shopping centers and similar types of modern building reflects today's dynamic architecture as it deals with the movement of people, flow of traffic, requirements of a generation on-the-go.

The architect, through a job well done, every day shows clients and others the saving graces of a well-designed, practical building—and to be practical means to serve in every respect, every direction. He is shouldering a full moral responsibility for building new cities measured to progress.

ROBERT E. HOWE, A.I.A.

Architect

PRESENT STATUS OF VETERINARY MEDICINE

Ever since animals were first domesticated in the pre-dawn of civilization, men associated with them have tried to cure their ills and relieve their suffering. Like the barber shop which was traditionally the birthplace of surgery as applied to man, the first beginnings of veterinary surgery and medicine by persons making a specialty of those activities probably occurred in the blacksmith shop across the street. Doubtless, approximately the same knowledge, skill and sanitation were applied in both establishments.

The real beginnings of modern veterinary medicine, however, were brought about through military necessity. Disastrous immobilization of armies due to sickness and disability of transport animals, resulted in the establishment of schools of veterinary medicine and research into causes and treatment of diseases of animals.

From this meager beginning, veterinary medicine has grown to its present status among the learned professions. Changing economic conditions resulting in greatly increased concentration, transportation and value of domestic animals, has made control of disease a prime necessity. Veterinarians have met this challenge and have made it possible to produce animal products so vital to our economy, on a scale undreamed of half a century ago.

The realization, years ago, that many diseases of domestic animals are transmissible to man, has increased the responsibility of the veterinarian in his relations with other branches of medicine. This challenge has also been met by the profession. Especially trained veterinarians now have their place in most public health organizations. But more important is the responsibility assumed by most practicing veterinarians to promptly report and to participate in the control of dangerous diseases transmissible to man.

Today, a degree in veterinary medicine requires six years of university training, comparable in all

respects to that required for graduation in other branches of medicine. The veterinary profession maintains ethical standards on a par with medicine, and veterinarians suffer in no respect when comparing their basic knowledge and technical ability with men in other medical fields. Moreover, they realize that vast fields of medical knowledge yet remain untapped and that maintenance of their present standards requires continued growth, with the same humility and devotion to duty which has marked their progress in the past.

Membership in the veterinary profession of today is a position of trust which any man may well be proud to assume.

RALPH L. WEST, D.V.M.,

*Secretary and Executive Officer
Minnesota Livestock Sanitary Board*

HOMEMAKER SERVICE

The Family Service homemaker service is planned to keep children in their own homes when the mother is out of the home temporarily for physical or mental illness. The Service maintains a staff of fifteen women who go into homes for several weeks to take care of the children during the mother's illness. Family Service pays these women by the hour.

The family receiving homemaker service pays the agency. They may pay full cost or part, depending on the income and size of the family. This is a costly child-care plan and is given only when there are two or more children in the home.

The father must make application for this service and a financial plan must be worked out before the homemaker is placed. A written recommendation is required from the physician, which gives some indication of the type of illness and an estimate of the length of time the homemaker will be needed. If the illness is of long duration such as tuberculosis, heart cases and the like, a homemaker is placed for a short time. During this time, the caseworker helps the father make plans for long-time care of the children.

If there are several very young children or an infant, it may be necessary to place the children in boarding homes instead of using homemaker service. Most of the homemakers can work only eight hours a day. The care of young children

Seventh editorial in a series on Family Service of Saint Paul, a Community Chest agency.

at night places too great a burden on the father.

The money available from the Community Chest for this service is limited. The refunds from families in 1954 was approximately 13 per cent. The hourly wage paid to the homemaker varies from \$1.05 to \$1.15, depending on the number of children in the family. There are additional costs such as transportation, insurance and social security for the homemaker.

This program was developed to help families at a point of crisis to keep children in their own homes. If the illness is of long duration, the Service keeps the family together until the father can make arrangements for long-time care.

Homemaker service, like all others offered by Family Service, is available to families living in the Community Chest area which is Ramsey County and West Saint Paul.

(MRS.) LOIS HOFFMAN

Director of Case Work Services

THE CHANGING PATTERN OF BANK LOANS

The pattern of banking in recent years has been essentially one of change. Especially in the field of loans have changes been made to keep pace with people's needs.

The development of personal credit, primarily to finance the purchase or improvement of homes, purchase of autos and home furnishings, has been typical. Twenty-five years ago, such loans were rare items on a bank's ledger, and installment loans to individuals were almost unheard of. Today, by contrast, more than one-half of the total dollar amount of loans in our bank are made to individuals as opposed to business firms. Two-thirds of these are on a monthly installment basis. The reasons for these changes are simple. They suit the customer's needs, and they are good business for us.

A similar condition prevails in the area of business loans. The types of customers and loans both have changed in these years. New industries like natural gas pipe lines, electronics manufacturers, and chemical companies have replaced others. Long-term credit is common now, whereas "90-day notes" were the unalterable lending device of yesterday. Many loans are made today which look to the projected cash earning power of a business for repayment rather than simply the seasonal liquidation of its inventory or accounts receivable.

Of the many types of loans which a modern

bank is eager to make to individuals, the following, though not an exhaustive list, might be of particular interest to professional people:

1. *Real Estate Loans*—made to finance the purchase, construction, or improvement of homes and commercial property. These can be made either on a conventional mortgage basis or with the additional insurance and guarantees of FHA and VA.

2. *Monthly Payment Budget Loans*—used for the purpose of purchasing automobiles, home appliances, or for any other reasonable personal need. Budget loans are frequently made on the borrower's signature only.

3. *Equipment Purchase Loans*—Doctors establishing their practice or extending their equipment facilities frequently find it convenient to finance such purchases, by monthly installments, over an extended period, such as three years.

4. *Single Payment Loans*—loans of this type are frequently made when the customer anticipates being able to repay the advance at one time. They are used for meeting tax payment deadlines, temporary financing to facilitate changing residence, or handling any other unusually heavy expenses. These loans are often secured solely by the customer's signature, but in some cases the bank may ask for the pledge of additional collateral. This may be in the form of almost any readily negotiable personal property. Incidentally, the borrower can usually command a more favorable rate of interest when he supports his loan with a collateral pledge.

These are examples of the changes in bank loaning services referred to at the outset. Perhaps the chief characteristic of modern bank loaning policy is "flexibility." In summary, almost everybody's reasonable borrowing requirements can be attended to quickly and satisfactorily in "today's banks."

BURTON N. NOAH

Assistant Cashier

The First National Bank of Saint Paul

ALCOHOLISM

The alcoholic isn't just the "bum in the gutter," but he may be John, Mary, Joe—my friend, relative, attorney, accountant, housewife, laborer, every known type of person and of every profession.

Rehabilitation and prevention are costly, but neglect is even more so. Neglect of attention to such a devastating illness runs into the billions of dollars in lost work time, lowered production, loss of trained personnel, waste of public funds in taxes that go for relief, state hospitals, clinics, emergency wards, missions and lodgings, courts and jails, and public welfare services. The appalling waste in human lives, broken homes, and abandoned children is beyond calculation.

The most important recent advance in treatment of alcoholism has not been the discovery of any new cure or wonder drug, but the spread of a more enlightened attitude toward the problem among both the medical profession and the general public.

The Citizen's Commission on Alcoholism of Minnesota, through its offices at 600 Lumber Exchange Building in Minneapolis and its seventy counseling centers throughout the state, carries on an extensive campaign of education by all media at its command to erase the stigma of alcoholism; to make known to professional people as well as to the general public the unbiased, scientific facts about alcohol and alcoholism; to stimulate the establishment of more treatment facilities; to encourage physicians and hospitals to accept alcoholics for treatment; to provide schools and colleges with material to use in their educational programs.

This type of campaign of education acts as a preventive measure by increasing the awareness to the symptoms of alcoholism and thus helps those afflicted to seek treatment in the early stages of the illness.

PAUL S. RAHNEFF, *Executive Secretary*
Citizens' Commission on Alcoholism,
of Minnesota, Inc.

ACCIDENTAL GUNSHOT WOUNDS

(Continued from Page 160)

of the arterial injury is indicated as soon as the shock phase has been corrected. Nerve injuries of the extremities should not be attacked as a primary problem but should be permitted to be repaired electively within a period of two weeks.

Prevention

A primary consideration in gunshot wounds is their prevention. Physicians in each community

In Memoriam

WILLIAM FRANK MAERTZ

Dr. William F. Maertz, former New Prague physician and civic leader, died January 3, 1956, at the age of seventy. At the time of his death, Dr. Maertz was a member of the staff at St. Peter State Hospital.

Born in New Prague, Dr. Maertz attended schools there and St. John's University; in 1908 he graduated from the medical school of the University of Minnesota. He interned at Minneapolis General Hospital and in 1909 started his practice in New Prague. He remained there until 1945, except for a period of service as a captain in the Medical Corps during World War I and a few years practicing medicine in Lidgerwood, N. D. While in the army, he was battalion surgeon for the 20th Engineers in France.

Dr. Maertz served as president of the Scott-Carver County Medical Society and was a member of the Minnesota State Medical Association and the American Medical Association. He was a member of Alpha Kappa Kappa fraternity.

He was a charter member of the Charles Borak Post No. 45 of the American Legion and served as first post commander. He was a delegate to the first national convention and in 1929 was Commander of the Third District.

Dr. Maertz was mayor of New Prague from 1920 until 1922 and held many offices in civic organizations, including the Community Club, the Catholic Workman, and Knights of Columbus.

He is survived by his wife; three daughters, Mrs. C. L. Cain of St. Paul, Mary Ruth of St. Peter, and Mrs. Robert Turner of Alexandria; his brother, Dr. B. L. Maertz of Willmar; and his sister, Mrs. John J. Kovarik, of Buffalo, New York. His son, Dr. Richard Maertz, preceded him in death.

have the opportunity to emphasize and reemphasize to their fellow citizens the necessity of careful care in the handling of firearms. Through the cooperation of sportsmen's clubs and civic organizations, the physician can bring to the attention of his community the morbidity and mortality associated with gunshot accidents. Simultaneously, he may stress the principles of first aid as applied to such injuries when they do occur.

President's Letter

SURVEY ON NATION'S PHYSICIANS

No doubt you have all been reading the results of the recently published survey on what the public thinks of the nation's physicians. It should be emphasized that although the AMA approved the questionnaire, the public, individual doctors, and the research agency really established the issues.

Interviewees were selected so that the proportion of people from various age, economic, geographical, and other groups matched the proportion of such people in the whole population; questions about general public attitudes were asked only of private individuals.

Some interesting major findings were revealed. One is that most Americans, 82 per cent, have a family physician. And they have a much higher opinion of their own physicians than of the medical profession as a whole.

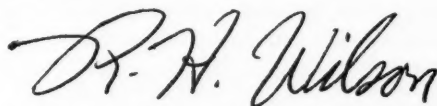
Only 19 per cent said it was hard to reach their own doctors in an emergency, but 51 per cent thought it was true of doctors generally. Only five per cent said their own doctors were too quick to recommend an operation, but 31 per cent thought it was true of the profession as a whole.

What people like about their doctors and expect from them, it appears, is sympathy, patience, and understanding: not guaranteed cures and "wonder drugs." Eighty-seven per cent thought their own doctors take sufficient personal interest in their patients but, again, only 54 per cent thought this true of the profession in general.

Among those interviewed 43 per cent thought most doctors charge too much, but only 16 per cent thought this was true of their own physicians. About 30 per cent believed "most doctors plan to get rich quick," but only 10 per cent thought this was true of their own doctors.

The basic purpose of this survey was to find out what might be needed to improve doctors' services. If it is to have a value beyond that of the ordinary statistical gimmick, each one of us must act as judge to see if any of the criticisms made in this survey of doctors in general can be applied to ourselves. The whole undertaking will have been futile if the results are not heeded and, certainly, the best guarantee for continuing our tradition of free enterprise in medicine will be to satisfy medical needs as fully as possible.

In closing, let me say that we can be justifiably pleased by the praise many interviewees had for our profession. Apparently most adverse criticism of the medical profession is directed at some other person's doctor.



President, Minnesota State Medical Association

Medical Economics

Edited by the
Committee on Medical Economics,
Minnesota State Medical Association
George Earl, M.D., Chairman

IOWA DECISION UPHOLDS DOCTORS

The Iowa court case between physicians and hospitals set forth this law: Hospitals cannot hire physicians and bill for their services, thereby engaging in the corporate practice of medicine.

To follow the salient features of the decision, first examine some of the factual conclusions of Judge C. Edwin Moore, who presided over the trial. Judge Moore said:

"The Court finds that pathology and radiology are recognized specialties in the practice of medicine."

* * *

"The Court further finds that laboratory medicine and radiology in their several branches are indispensable to attending physicians in modern medical care, and that facilities must be available in or near hospitals, and that the ownership and maintenance of laboratory facilities is an integral part of a modern hospital."

* * *

"The Court further finds that diagnostic x-ray and radioactive isotope procedures often provide the final diagnosis of the patient's ailment and that fluoroscopy undertaken by the radiologist has the same result, and that the written radiological diagnosis will usually be adopted by the attending physician as the final diagnosis in the case."

* * *

"The pathological and radiological diagnoses are available for acceptance by the attending physician just as are the diagnoses of other consultants in other medical specialties. In many instances, they are so accepted and become the final diagnosis in the case."

* * *

"The Court further finds the great weight of the opinion testimony offered herein establishes that the pathologists and radiologists are engaged in the practice of medicine in their activities as shown by the evidence."

Practice of Medicine Defined

One of the crucial points in the argument was a contention by counsel for the Hospital Association that pathologists and radiologists are not truly in the practice of medicine. Judge Moore cited two sections of the Iowa Code to refute the argument:

"PERSONS ENGAGED IN PRACTICE: For the purpose of this title the following classes of persons shall be deemed to be engaged in the practice of medicine and surgery:

"1. Persons who publicly profess to be physicians or surgeons or who publicly profess to assume the duties incident to the practice of medicine or surgery.

"2. Persons who prescribe, or prescribe and furnish medicine for human ailments or treat the same by surgery.

"3. Persons who act as representatives of any person in doing any of the things mentioned in this section."

"It is not confined to the administering of drugs. Under this statute, one who publicly professes to be a physician and induces others to seek his aid as such is practicing medicine. Nor is it requisite that he shall profess in terms to be a physician. It is enough, under the statute, if he publicly profess to assume the duties incident to the practice of medicine. What are 'duties incident to the practice of medicine?' Manifestly, the first duty of a physician to his patient is to diagnose his ailment. Manifestly, also, a duty follows to prescribe the proper treatment therefor. If, therefore, one publicly profess to be able to diagnose human ailments, and to prescribe proper treatment therefor, then he is engaged in the practice of medicine."

The Judge held that corporations cannot practice medicine, because they are not "persons" in the strictest sense. He pointed to this language used by the Iowa Supreme Court:

"The right to lawfully practice medicine in this state is a personal one. To attain such right, certain statutory requirements must be complied with."

"Medical practice acts are enacted for the protection of the public against the unskilled treatment of the sick or diseased by persons having neither the preparation nor the skill to diagnose diseases or to administer powerful and poisonous drugs. The welfare of the public is of the utmost concern in the enforcement of laws designed to guard and protect the public health. The merits of the secret formulas used in the treatment of cancer and other diseases is not of controlling importance in the decision of this case. Our concern is with the statute, which should be strictly observed."

Same Rules for Non-Profit Hospitals

The decision was reached solely on the basis of the law, and Judge Moore included this statement in his summation:

"The Court casts no reflections at plaintiff hospitals, but good motives do not provide immunity from the application of the statutes or the principles of law. The law applies to all and must not be violated even if the intention is only to do good."

He also said that most of the reasons given in the decisions condemning corporate practice generally are applicable to non-profit corporations.

Judge Moore also gave his opinion that the pathologist or radiologist, by permitting a hospital to bill for medical services in the name of the hospital without the consent of the patient or his legal representative, had violated the provisions of the Iowa Code dealing with "unprofessional conduct" and the division of fees.

Final Conclusions of the Court

The final Conclusions of Law were stated in this way:

"It is the conclusion of the Court that under the facts established in this case and the law as the Court understands it, that the work done by the pathologist, radiologist, and the technicians working in the pathology and x-ray laboratories, constitutes the practice of medicine.

"That under the Iowa law the privilege of practicing medicine is a personal one requiring qualifications which cannot be met by a corporation.

"That the provisions of Chapter 135B (Iowa Code) do not grant hospitals any right to practice medicine by the operation of pathology and x-ray laboratories in the manner shown by the evidence.

"That plaintiff hospitals are not excluded from the requirements of the Iowa practice acts in regard to the practice of medicine on the basis that they are non-profit corporations or because of long standing custom and inactivity on the part of those charged with enforcing the law, or because of public policy in the absence of legislative enactment.

"The Court does not intend that any findings or conclusions herein affect in any way the obligation of public hospitals . . . to provide medical treatment for indigent persons or tuberculous patients . . . wherein medical treatment is to be provided by hospitals of that category to patients of certain entitlement, nor as to the operation by the State of mental or other hospitals authorized by law.

"The Court is not to be understood as holding the plaintiff hospitals cannot own and maintain facilities of pathology and x-ray laboratories and receive just compensation for the use thereof, as certainly these are essential and necessary parts of a modern hospital, nor that the operation of said laboratories within the law need affect the care and treatment to be given the patients.

"It is the opinion of the Court that the furnishing of proper pathology and x-ray services to the patients in the hospitals can be worked out on the local level and within the law."

COLORADO AND IDAHO DECISIONS

That corporate practice of medicine is illegal was reaffirmed in two other states recently.

In Colorado, a suit by a chiropractic corporation was dismissed when the Judge held that the chiropractic corporation itself was illegal through its corporate "practice of medicine;" and therefore it had no redress in the courts.

This decision held that a state has the constitutional power to prohibit a corporation from practicing a learned profession. Regarding the question of whether a corporation can nonetheless still engage in the practice of a learned profession through its agents and employees who are themselves licensed to practice, the Colorado Supreme Court was quoted as clearly saying that a corporation cannot practice dentistry and that a corporate hospital cannot practice medicine or surgery.

The decision read:

"If the reason for the rule that a corporation cannot practice medicine is an expressed legislative desire to protect the public against unauthorized, unqualified and improper practice of the healing arts, and to maintain the personalized relationship between the healer and the patient, then whether a corporation was organized for profit or non-profit would be of no legal significance.

"In a hospital the medical services of the interns and residents are only a small part of the total medical services rendered therein, most of the medical services being rendered by individual licensed practitioners who have placed their own patients in the hospital."

It was held that for a corporation to completely staff a hospital and through this staff to treat patients of the corporation was entirely different from usual hospital practice.

In Idaho, the Attorney General gave an opinion on the legality of a sample contract between a hospital and an anesthesiologist.

The contract was basically a percentage agreement between the doctor and the hospital corporation. The issue was whether the contract placed the hospital corporation in the practice of medicine because the physician-anesthesiologist was an "employee."

The Attorney General ruled that it did and advised that hospitals who employed physicians were engaged in the practice of medicine in violation of Idaho law. Also, that the actions of the doctor and the manner in which he would practice his profession could actually be controlled by the hospital under such conditions.

PRESIDENT'S 1956 HEALTH MESSAGE

The President's 1956 health message contained no real surprises. The multi-million dollar program, called "a partnership in which private and governmental enterprise are joined to advance the public welfare" included a request for an appropriation of \$126,525,000 for basic medical research. The major share of the funds would go to medical schools, hospitals and private laboratories for their own research.

Congress was asked to authorize \$250,000,000 to be spent in construction of research and teaching facilities for medical, dental and public health schools.

Federal reinsurance schemes have been dropped temporarily. An effort will be made to amend antitrust laws to enable private insurance companies to pool their risks, thus encouraging faster progress in extending coverage to older people, to those living in rural areas, to self-employed persons and in providing for catastrophic illness protection.

The President asked for extension for two years beyond June 30, 1957, of the federal-state program to help build public hospitals and other health facilities, and new authorizations of \$19 million to carry this out. He also asked for extension of the water pollution act and an increase in funds to broaden the attack on problems of air pollution.

The administration requested that the act permitting federal gifts of polio vaccine to the states for free distribution to children and pregnant women be continued through June, 1957, with an appropriation of \$30 million to complete this program.

Another recommendation was for \$53 million for construction and improvements at Veterans Administration hospitals. During the 1957 fiscal year, it is expected that the average daily load of the veterans hospitals will be about 111,500 patients.

MINNESOTA STATE BOARD OF MEDICAL EXAMINERS

230 Lowry Medical Arts Building

Saint Paul 2, Minnesota

F. H. Magney, M.D., Secretary

SAINT PAUL QUACK SENTENCED TO WORKHOUSE FOR ONE YEAR

*Re: State of Minnesota vs. Frank H. Gold, alias
Dr. Frank Stone*

On February 7, 1956, Frank H. Gold, thirty-eight, 129 W. Summit Avenue, Saint Paul, after entering a plea of guilty to a charge of practicing healing without a basic science certificate, was sentenced by the Hon. Arthur A. Stewart, Judge of the District Court of Ramsey County, to a term of one year in the Saint Paul Workhouse. The defendant had been charged in a criminal complaint issued on January 20, 1956, with making an examination of a Saint Paul woman, after representing to her that he was "Dr. Frank Stone," a heart specialist. Gold, who had been working as a salesman for an automobile company in Saint Paul, had in his possession at the time of his arrest a prescription pad which had the name "Frank H. Gould, M.D." printed across the top. In the car that the defendant had been using was found a large black medical bag which contained numerous drugs, salves, and lotions, an atomizer, hypodermic syringe and needle, stethoscope and also some surgical instruments.

Gold has never studied medicine but was employed for several years as an orderly at a hospital in New York City, and also worked in the same capacity for at least three hospitals in Minneapolis and Saint Paul. He has three previous convictions in Hennepin County District Court involving violations of the Basic Science Act. Gold was first arrested on May 18, 1946, by Minneapolis police officers for representing himself as a physician and surgeon. He pleaded guilty on May 21, 1946, and on June 12, 1946, was sentenced to a term of one year in the Minneapolis Workhouse. Because it was Gold's first conviction, the sentence was stayed and the defendant placed on probation. In March, 1948, it was learned that Gold was again practicing healing illegally by representing himself as a doctor of medicine. On March 8, 1948, Gold pleaded guilty to the charge and was sentenced by Judge Levi M. Hall to one year in the Minneapolis Workhouse. The defendant was again arrested on January 14, 1950, and on January 18, 1950, he entered a plea of guilty before the Hon. John A. Weeks, Judge of the District Court, to an information charging him with the crime of practicing healing without a basic science certificate. Judge Weeks sentenced Gold to serve one year in the Minneapolis Workhouse. The basis of the charge was that Gold had been representing himself as "Dr. Frank H. Gould" and that he had requested one of the Minneapolis drug stores to print some prescriptions for him and after receiving the prescriptions wrote several. The prescriptions were questioned by a pharmacist which led to Gold's arrest.

Gold was also convicted in 1951 in Federal District Court in Saint Paul of several violations of the World War II Servicemen's Readjustment Act of 1944 for illegally obtaining certain benefits under the act and also for making false statements in doing so. On September 4, 1951, Gold was sentenced by the Hon. Robert C. Bell, Judge of Federal District Court in Saint Paul, to pay a fine and also to serve a one-year term in prison.

The Dean's Page

EDUCATION FOR GENERAL PRACTICE

The increase in medical specialization over the past quarter century has given rise to concern as to an adequate number of family physicians who, it is agreed, provide the basic foundation of good medical service and are able to care for the vast majority of their patients' medical needs. In fact, it has been feared by some that the specialists on the teaching faculties of medical schools may by their very presence encourage students to specialize rather than enter general practice. Actually, medical faculties are thoroughly cognizant of the importance of the family physician and make conscious efforts to set up their teaching programs for the specific purpose of giving their students the best *general medical education* possible, limiting the teaching of the specialties to what the general physician should know. This much we have known. The question is "What has been the result?" A special comprehensive study recently released by Dr. Frank Dickinson, Director of the AMA's Bureau of Medical Economic Research, presents significant information on this point. What Doctor Dickinson has done has been to analyze the data in the AMA Directory of Physicians by type of practice and school and year of graduation.

For the University of Minnesota, this report shows that of the 2,432 physicians who were graduated between 1930 and 1950, 44 per cent are engaged in general practice, 6 per cent are part-time specialists, 23 per cent are full-time specialists, and 27 per cent are not now in private practice. Some of this latter group are in military service and some in residencies. Of all the physicians in active practice who were graduated from medical schools in the United States between 1930 and 1945, 46 per cent are in general practice. For the University of Minnesota graduates, the corresponding figure is 54 per cent in general practice; for the University of Iowa, 46 per cent; for the University of Kansas, 52 per cent; for the University of Nebraska, 53 per cent; for the University of Colorado, 44 per cent; for the University of Wisconsin, 45 per cent; for the University of Illinois, 49 per cent; for the University of Michigan, 34 per cent, and for Northwestern University, 38 per cent.

It is interesting to note also that the number of Minnesota graduates who entered general practice was 41 per cent for the five-year period, 1930-34; 40 per cent, for 1935-39; 48 per cent, for 1940-44; and 46 per cent for 1945-49.

There are other aspects of Doctor Dickinson's report which merit further study, but the above figures indicate that the University of Minnesota is not doing badly in educating general physicians and that among recent graduates of this medical school there is no trend away from general practice into specialization.

—HAROLD S. DIEHL, *Dean*
University of Minnesota Medical School

Reports and Announcements

MEDICAL MEETINGS

State

Minnesota State Medical Association, annual meeting, Mayo Civic Auditorium, Rochester, May 21-23, 1956.

Minnesota Society of Obstetrics and Gynecology, spring meeting, Radisson Hotel, Minneapolis, April 12-14, in conjunction with meeting of American College of Obstetricians and Gynecologists. Secretary, Dr. Edward A. Banner, Rochester.

Minnesota Surgical Society, spring meeting, Rochester, May 11. Secretary, Dr. Owen G. McDonald, Duluth.

Northwest Pediatric Society, spring meeting, Rochester, May 22, in conjunction with meeting of Minnesota State Medical Association. Secretary, Dr. T. C. Papermaster, Minneapolis.

National

American Association of Blood Banks, ninth annual meeting, Somerset Hotel, Boston, Massachusetts, September 3-5. Secretary, Marjorie Saunders, 725 Doctors Building, 3707 Gaston Ave., Dallas, Texas.

American Cancer Society and National Cancer Institute, Third National Cancer Conference, Sheraton-Cadillac Hotel, Detroit, Michigan, June 4-6. Write National Cancer Conferences Coordinator, American Cancer Society, 521 West 57th Street, New York 19, New York.

American College of Gastroenterology, Southern Region, Louisiana State University School of Medicine, New Orleans, Louisiana, April 8. Secretary, American College of Gastroenterology, 33 West 60th Street, New York 23, New York.

American Goiter Association, Drake Hotel, Chicago, Illinois, May 3-5. Secretary, Dr. John C. McClintock, 149½ Washington Ave., Albany, New York.

American Ophthalmological Society, Hot Springs, Virginia, May 31 to June 2.

Gill Memorial Eye, Ear and Throat Hospital, twenty-ninth annual Spring Congress, Roanoke, Virginia, April 2-7.

Industrial Health Conference, sponsored by organizations of industrial physicians, dentists, nurses, hygienists and government agency workers, at Convention Hall, Philadelphia, Pennsylvania, April 21-27. Write Industrial Health Conference, 28 East Jackson Boulevard, Chicago 4, Illinois.

Medical Library Association, fifty-fifth annual meeting, Hotel Statler, Los Angeles, California, June 18-22. Write Mrs. Ella Crandall, Librarian, Los Angeles County General Hospital, 1200 North State Street, Los Angeles 33, California.

Oregon Academy of Ophthalmology and Otolaryngology, fifteenth annual Spring Convention in Ophthalmology and Otolaryngology, University of Oregon Medical School, Portland, Oregon, March 19-22.

International Meetings

Canadian Medical Association, Quebec, Canada, June 10-14. Secretary, Dr. Arthur D. Kelly, 150 St. George St., Toronto, Ontario, Canada.

Congress of International Anesthesia Research Society, Miami Beach, Florida, April 9-12. Write Dr. R. J. Whitacre, 13951 Terrace Road, Cleveland, Ohio.

Congress of International Society of Hematology, Hotel Somerset, Boston, Massachusetts, August 27 to September 1. Secretary, Dr. W. C. Maloney, 39 Bay State Road, Boston, Massachusetts.

Inter-American Congress of Cardiology, Havana, Cuba, November 4-10. Write Dr. Ramon Aixala, Apartado 2108, Havana, Cuba.

International Academy of Pathology, Cincinnati, Ohio, April 24 and 25. Secretary, Dr. F. K. Mostofi, Armed Forces Institute of Pathology, Washington 25, D. C.

International Academy of Proctology, eighth annual convention, Drake Hotel, Chicago, Illinois, April 23-26. Secretary, Dr. Alfred J. Cantor, International Academy of Proctology, 147-41 Sanford Avenue, Flushing 55, New York.

International Congress of Clinical Chemistry, Hotel New Yorker, New York, September 9-14. Secretary, John G. Reinhold, 711 Maloney Building, University of Pennsylvania, Philadelphia 4, Pennsylvania.

National Congress of Pediatrics, Cuidad Universitaria, Mexico D. F., Mexico, May 1-5, 1956. Dr. Ignacio A. Cisneros, chairman, Calzada de Madereros No. 240, Mexico 18, D. F., Mexico.

Pan American Medical Association, Tenth Inter-American Congress, Mexico City, Mexico, April 15-21, 1957. Executive director, Dr. Joseph J. Eller, 745 Fifth Avenue, New York, New York.

World Medical Association, Havana, Cuba, October 9-15. Secretary, Dr. Louis H. Bauer, 345 E. 46th St., New York 17, New York.

SCHERING AWARD COMPETITION

The eleventh annual Schering Award competition has been announced. Medical students are invited to select one of three subjects and submit papers in competition for a \$500 first prize and a \$250 second prize in each of the three subject classifications. Subjects for 1956 are as follows: (1) The Clinical Use of Adrenocortical Steroids in Collagen Diseases, (2) Metabolic Aspects of the Aging Process, and (3) New Applications of Antihistamines in Medicine and Surgery.

Information and entry forms are being distributed in medical schools. Students who wish to participate should submit entry forms before July 1, and manuscripts must be postmarked not later than September 30. The contest is sponsored by Schering Corporation.

REPORTS AND ANNOUNCEMENTS

WINONA COUNTY SOCIETY

Dr. W. O. Finkelnburg, Winona, was elected president of the Winona County Medical Society at a meeting of the organization at the Hotel Winona on January 9. He succeeds Dr. Philip Heise in the post. Named as vice president of the group was Dr. Sidney O. Hughes, with Dr. L. J. Wilson as secretary and Dr. W. W. Haesly as treasurer, all of Winona.

Dr. Lewis Younger, Fair Oaks, was named delegate to the state association. Dr. H. W. Satterlee, Lewiston, was named alternate.

The meeting was attended by twenty-one Winona County physicians and their wives.

ST. PAUL SOCIETY OF INTERNAL MEDICINE

The St. Paul Society of Internal Medicine will hold a meeting at the St. Paul University Club on April 19, at 6:30 p.m. Dr. M. E. Janssen will present a paper on "Paroxysmal Hemoglobinuria." Also on the program will be a discussion of the Blue Shield Plans A and B for major medical illness.

ST. PAUL SURGICAL SOCIETY

The next meeting of the St. Paul Surgical Society will be at the Minnesota Club in St. Paul on March 21, with dinner at 6:00 p.m. preceding the scientific meeting. The principal speaker will be Dr. Donald McCain.

AERO MEDICAL ASSOCIATION

The annual meeting of the Aero Medical Association will be held at the Drake Hotel, Chicago, Illinois, on April 16, 17, and 18, 1956.

This year's meeting will provide the most comprehensive review of current progress in Aviation Medicine ever presented. There will be 137 papers presented dealing with every aspect of the field and coming from military and civilian sources in nine countries.

Of particular interest will be the section meetings which will include in their agenda panel discussions of vital topics by top authorities in each field. Those sections convening will include the following sub-specialties: Space Medicine, Civil Aviation Medicine, Aviation Physiology, Aviation Ophthalmology, Acceleration and Deceleration, Air Passenger Transportation, Noise and Vibration, Pilot Selection and Aviation Psychology, Personal Equipment, Aviation Pathology, Aviation Medi-

cal Education, and a combined symposium on Escape from High Performance Aircraft.

All members of the profession are cordially invited to attend any or all of these sessions.

The Wives Wing of the Aero Medical Association, composed of over 300 wives of Association Members, will hold their annual functions on the same dates. All wives of persons in the profession are also cordially invited to attend.

COURSES IN PEDIATRICS

The following short courses will be conducted at The Children's Hospital of Philadelphia in May and June, 1956.

1. Pediatric Advances for Pediatricians and General Practitioners. May 28 through June 1, 1956. A Refresher Course conducted by the Staff of the Children's Hospital of Philadelphia, in collaboration with the Department of Pediatrics of the University of Pennsylvania and the Camden Municipal Hospital. Tuition—\$100.00.

2. Practical Pediatric Hematology. June 4, 5, and 6. Conducted by Dr. Irving J. Wolman and other members of the Hematology Department of the Children's Hospital, under the auspices of the Graduate School of Medicine, University of Pennsylvania. Tuition—\$60.00.

3. Blood Group Incompatibilities and Erythroblastosis Fetalis. June 7 and 8. Conducted by Dr. Thomas R. Boggs, Jr., of the Philadelphia Serum Exchange of the Children's Hospital of Philadelphia, under the auspices of the Graduate School of Medicine, University of Pennsylvania. Tuition—\$50.00.

For information, write to Irving J. Wolman, M.D., Children's Hospital of Philadelphia, 1740 Bainbridge Street, Philadelphia 46, Pennsylvania.

MINNESOTA STATE BOARD OF MEDICAL EXAMINERS

An examination for medical licensure will be given by the Minnesota State Board of Medical Examiners beginning Tuesday, June 12, 1956, continuing on Wednesday and concluding with a practical examination on Thursday, June 14, 1956. Candidates should have their completed applications, required credentials and fees on file thirty days prior to the examination.

CONTINUATION COURSES AT THE UNIVERSITY OF MINNESOTA

Center for Continuation Study

| Dates | Course | Guest Speaker |
|--------------|--|---|
| March 19-21 | Cardiovascular Diseases for General Physicians | Dr. Hans Hecht, University of Utah College of Medicine |
| April 7 | Trauma for General Physicians | |
| *April 9-11 | Endocrinology for General Physicians | Dr. Peter H. Forsham, University of California Medical School |
| *April 16-18 | Radiology for General Physicians | |
| May 7-12 | Electrocardiography for General Physicians | |

*Dates changed since previous announcements.

Woman's Auxiliary

MOWER COUNTY AUXILIARY

Mrs. L. J. Leonard

Editor, Minnesota Medicine Auxiliary News

In response to my December request to county presidents for material to be used in MINNESOTA MEDICINE, I received a newspaper clipping from Mrs. Robert R. Wright, Austin, president of the Mower County Auxiliary. It was excellent publicity, consisting of five pictures and a news column covering their fifth annual effort in behalf of nurse recruitment and allied medical careers.

On January 23, the Mower County Auxiliary sponsored a tour of St. Olaf Hospital in Austin for 200 high school girls interested in these professions. The tour was followed by a tea at the local YWCA and several of the girls' mothers also attended.

Miss Miriam Berg and Miss Lois Atheson, instructors at the Methodist Kahler School of Nursing, Rochester, were speakers. They stressed the fact that hospital admissions had doubled since 1935, creating a constantly increasing need for medical personnel. They urged the selection of science courses in high school, with an emphasis on chemistry, as these subjects are important entrance requirements for admission to nurses' training schools. Those who would enjoy the service of nursing and have a good scholastic average should apply.

Other fields discussed were vocational nursing, medical technology, x-ray technology, occupational therapy, physical therapy and dietetics. A film, "When You Choose Nursing," was shown.

Mr. Peter Bye, assistant administrator at the hospital, conducted one of the tours and explained the use of the x-ray machine.

The news picture showed eighteen of the girls who attended, which was outstanding co-operation from the newspapers. A story like this has a great deal of local interest and is good public relations. In charge of arrangements were Mrs. Stanley Peterson, Mrs. E. C. Sargent and Mrs. George Stahl.

Letter to the Editor

Dear Editor:

I know that this is an unusual request, but I should appreciate any help that you can give me in this matter. I am attempting to locate a Miss Virginia McLoad who graduated from Pine Bluff High School in 1931 and who is a graduate nurse married to a doctor now practicing in Minnesota.

Both Virginia and her husband did medical work in Puerto Rico in the late '30s or early '40s. I know this is pretty scant information to go on, but I have exhausted all other sources of information.

Yours very truly,
LESTER SILBERNAGEL

Pine Bluff, Arkansas
January 17, 1956

HYPOTENSIVE DRUGS

(Continued from Page 173)

tosus. Such reactions can be completely reversed by discontinuing use of the drug.

Hexamethonium and pentapyrrolidinium bitartrate (ansolysen) are potent hypotensors and should be used only for severe hypertension. Treatment should be initiated with the patient under observation in the hospital, and the patient must learn to determine his own blood pressure and regulate dosage. The drugs can be given subcutaneously or orally but the oral route has been used with increasing frequency. The dosage varies greatly with each person. Initial oral doses of hexamethonium are 125 to 250 mg. of the salt before each meal and at bedtime; each day individual doses are increased by 125 mg. The maximal dose is 1,250 mg. four times daily. Initial oral doses of ansolysen are 20 mg. given in the same manner as is hexamethonium. Doses are increased by increments of 20 to 40 mg. and the maximal dose is 400 to 500 mg. four times daily.

Untoward side reactions of these ganglion-blocking agents are orthostatic hypotension, blurring of vision, constipation and urinary obstruction, especially in elderly men. A few patients have paralytic ileus, which necessitates discontinuance of therapy. Constipation, which is common, usually can be controlled by mild laxatives and sublingual use of neostigmine, 15 to 30 mg. one or more times a day. Nocturia and difficulty in urination may be relieved by sublingual use of bethanechol chloride (urecholine), 5 mg. one to three times a day. In some instances, transurethral prostatic resection must be performed or treatment with the drug discontinued. Impotence is common.

Treatment of essential hypertension by drugs is as yet not completely satisfactory. All available drugs have unpleasant and sometimes serious side effects. However, judicious and intelligent use of one or more of the agents mentioned will reduce blood pressure in most cases of essential hypertension.

The Savings Bonds sales program is truly an "All-American" program. Every participant can take pride in it. The savings—large and small—which have gone into this program have been building important financial reserves for our people which will enable them to enjoy a finer, more secure future. These investments are making a vital contribution to the sound management of our Nation's finances.—GEORGE M. HUMPHREY, Secretary of the Treasury.